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S. Hrg. 103-331

USE OF WATER TO CONTROL GRAIN DUST

Y 4. AG 8/3: S. HRG. 103-331

Use of Water to Control Grain Dust,... G

BEFORE THE

SUBCOMMITTEE ON
AGRICULTURAL RESEARCH, CONSERVATION,
FORESTRY, AND GENERAL LEGISLATION

OF THE

COMMITTEE ON AGRICULTURE,
NUTRITION, AND FORESTRY
UNITED STATES SENATE

ONE HUNDRED THIRD CONGRESS

FIRST SESSION

ON

THE USE OF WATER TO CONTROL GRAIN DUST

SEPTEMBER 9, 1993

Printed for the use of the
Committee on Agriculture, Nutrition, and Forestry

MAR 2 1994

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USE OF WATER TO CONTROL GRAIN DUST

THURSDAY, SEPTEMBER 9, 1993

U.S. SENATE, SUBCOMMITTEE ON AGRICULTURAL RESEARCH, CONSERVATION, FORESTRY, AND GENERAL LEGISLATION, COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,

Washington, DC.

The subcommittee met, pursuant to notice, 2:36 p.m., in room SR-332, Russell Senate Office Building, Hon. Thomas A. Daschle, chairman of the subcommittee, presiding.

Present or submitting a statement: Senators Daschle, Kerrey, and Craig.

STATEMENT OF HON. THOMAS A. DASCHLE, A U.S. SENATOR FROM SOUTH DAKOTA

Senator DASCHLE. The hearing will come to order.

I want to welcome all our witnesses and those who have come to participate today.

The U.S. Department of Agriculture's Federal Grain Inspection Service (FGIS) is responsible for designing grain standards that effectively communicate the storability and end-use characteristics of grain, maintaining and supervising the official inspection system, and conducting mandatory inspections of export grain. FGIS was last reauthorized in 1988, and this authority expires September 30th of this year, in a matter of weeks.

This subcommittee has conducted frequent and, in my view, fairly intensive oversight activities on FGIS. Also, at the subcommittee's request, the General Accounting Office conducted a year-long investigation.

On May 13th of this year, the subcommittee held a hearing to examine opportunities to improve the operations of FGIS. Among other witnesses at that hearing, GAO presented the results of their investigation. The hearing demonstrated a consensus of views that were incorporated into a discussion draft of legislation to reauthorize FGIS. [1] This discussion draft was recently distributed to interested parties, as well as to today's witnesses, for comment.

With the exception of the proposal to ban the use of water on grain, the legislation has been generally received with virtual unanimity. Very briefly, the bill extends FGIS inspection operations and authorizes appropriations with FGIS through September 30th of the year 2003. It provides increased flexibility to the agency and

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[1] See pp. 53-61.

enables FGIS to do fee-based testing of commercial inspection and weighing equipment. It is my hope that this proposed legislation will enable FGIS to operate in a more efficient manner and, at the same time, more effectively meet the needs of the U.S. grain industry.

Another mission of FGIS, and one that was given higher priority by the grain quality title of the 1990 farm bill, is to provide leadership through incentives in the grain marketing system for all participants, from plant breeders, to farmers, to country elevators, to shippers, and to exporters, to meet the quality needs of end users. Not only does the U.S. grain industry have to compete in the world export market, it increasingly has to compete with other countries in our own domestic market.

Within the U.S. grain industry, water systems are now used to control grain dust. This may be an effective dust control technique that when used properly does not add weight or cause end-use quality problems. There is evidence, however, that many foreign buyers find the practice unacceptable and insist that the inspection documents certify that water has not been added. Furthermore, the opportunity to add weight in the name of dust control and sell water for the price of grain may be an irresistible temptation for some.

Adding water to grain for the purpose of increasing weight is economic adulteration. Such adulteration is illegal under the Federal Food, Drug, and Cosmetic Act. Enforcing this law is the responsibility of the Food and Drug Administration. That agency has not issued any regulations on adding water to grain and has never taken any enforcement actions against violators, to the best of this subcommittee's knowledge.

We've been made aware of numerous cases, however, of abusive watering practices, and these abuses must stop.

It appears that the Federal Government is currently incapable of even defining, let alone preventing, economic adulteration of grain through the addition of water. It seems the only practical way to regulate the use of water is to prohibit it—not only to stop the abuse, but also to preserve the integrity of U.S. grain in domestic and international markets.

I have proposed legislative language to ban the addition of water to grain. However, I want to ensure that legislative and/or regulatory solutions to the abusive addition of water to grain do not impede the development and implementation of new water-based fogging systems or the use of water as a carrier in the application of amendments such as pesticides, vitamins, or dyes. The proposed language is subject to review and comment and is the key issue to be discussed here today.

Instead of banning the application of water, I would prefer a solution that is self-enforcing in the marketplace. In my view, it would be preferable simply to eliminate any potential financial gain that would result from adding water to increasing weight. Pricing and contracting grain on the basis of its dry matter weight is exactly such a market-driven enforcement scheme. Maybe in the long run the marketing system will move to dry matter pricing. However, there is currently no indication of a shift in that direction by the industry and nothing to encourage the adoption of dry matter marketing, so frankly, we have no choice.

Grain is not just a bulk commodity. It is an industrial ingredient that must meet the quality specifications of different processors making different products. For this Nation's grain industry to compete in a global market and in our own domestic market, we need a grain marketing system that rewards quality, with quality defined by end-use value.

I recognize that the addition of water is only one of at least three techniques now being used to control grain dust. The prohibition being proposed eliminates water-based dust control systems. Forgoing water-based dust control would not come without costs. However, I believe there are even greater costs associated with using water. Among other things, the use of water will cost this country immense sales of foreign grain—I should say, of grain to foreign countries.

This summarizes my initial views and the reasons I believe water should be prohibited. As I have made clear, I won't solidify my position until I've had the benefit of the industry's thorough review of the issue. I am appreciative of the comments the subcommittee has received thus far, which are generally supportive of the action to end the abusive use of water on grain.

This hearing is designed to examine the issue more closely and evaluate the solutions to end the abusive practices of watering grain included in the proposed legislation.

With that, let me call to the witness table our witnesses for the day.

We are fortunate to have someone who has been to this table with this subcommittee for more hours than perhaps anybody else in Washington, DC. David Galliart is here as the Acting Administrator of FGIS. He's accompanied by Mr. Stang and Mr. Shipman, and I'd invite them to come, as well.

Dr. Jim Steele, of the U.S. Grain Marketing Research Lab; Mr. Joseph Botos, the Vice President of the Administrative Division of Cargill; Mr. Steve Lucas, Vice President of Logistics and Operations for the Dreyfus Corporation; and Mr. Winston Wilson, President of U.S. Wheat Associates.

If all of those people could come to the table, we will begin the hearing at this time.

Gentlemen, we are pleased that you could take time from your schedules to enlighten us and to participate in what I hope will be a productive discussion this afternoon. I think we will take the opening statements in the order in which they were presented here. Let me begin with Dave Galliart. Once Mr. Galliart has presented his opening remarks, I will ask Mr. Stang, who has accompanied him, for some comment in concert with the testimony to be presented to us officially by the Acting Administrator.

So, Dave, thank you for coming, and please proceed.

Mr. GALLIART. Senator Daschle, with your permission, I would defer to Dr. Jim Steele, ARS, to give us some background material regarding the addition of water to grain.

Senator DASCHLE. Okay, very good.

Mr. Steele.

STATEMENT OF JIM STEELE, U.S. GRAIN MARKETING RESEARCH LAB, AGRICULTURAL RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, MANHATTAN, KS

Dr. STEELE. Thank you

Mr. Chairman, I am pleased to be with you today to discuss the issue of control of grain dust and I appreciate very much having the invitation to share some thoughts and facts, perhaps, on grain dust control.

Grain dust control is essential, as I think most of us will agree, in most of our commercial grain-handling facilities. The extent of the disaster that can happen if we don't pay attention to that is well known. Grain dust control is generally needed whenever a facility transfers grain at rates greater than 2,000 bushels per hour. Some facilities attain transfer rates in excess of 50,000 bushels per hour. Even in grain containing low percentages of dust, the number of small dust particles present can create explosive dust clouds during grain handling and the possibilities for their ignition and resulting risks are numerous.

The principal grain dust risks are the health and safety of workers and loss of property as a result of physical damage and destruction. These safety factors, coupled with economic and Government regulations, require full consideration of any and all practical methods for dust control whenever grain is handled on a regular or routine basis.

The statistics over the last decade or so show trends for reductions in deaths and injuries and give credence to the industry's efforts to address this serious problem.

While settled grain dust becomes a fire and explosion hazard, the grain dust that is suspended in air is an explosion hazard and may be a health hazard to workers who inhale airborne particles. Airborne dust limits are set in terms of exposure concentrations and exposure times. Settled dust is addressed by OSHA's action level for priority housekeeping which requires immediate removal for layers exceeding 3.2 mm (⅛ in). Visible dust emissions are subject to environmental and clean air regulations and the Clean Air Act requires States to implement standards, certification, licensing, and fees for some elevator operations.

In addition to the risks and regulation requirements mentioned, many elevator operational problems are lessened by using dust control measures. For example, fine particles that segregate during grain handling interfere with product uniformity and may cause accelerated deterioration of various grain quality attributes during long-term storage. Airflow, fumigation and microbial activity are adversely affected if the stored grain contains pockets of fine material. Nonuniformity can also contribute to errors in sampling the grain and assessing its value.

While the above are substantial mandates for grain dust control, many economic costs must be considered when implementing and designing a dust control system. In addition, any dust that is separated from the grain or is incorrectly accounted for is an economic loss to the grain handlers known as shrinkage or weight loss. Fire and explosion risks are proportional to the type of grain and its composition, breakage susceptibility, the handling method and the

quantity and rate of handling, and typically, grain contains 0.01 to 0.3 percent dust by weight.

There are three conditions which are required for grain dust to explode. One is that the combustible dust must be present in sufficient concentration. Second is that oxygen must be present, and third, a sufficient ignition source must be present or take place. If all of these conditions exist, there will be an explosion and the physical damage that occurs from that explosion is a result of the pressures not being released adequately to the environment.

Dust is composed of organic and inorganic particles. In any sample of dust, the particles have a unique size and weight distribution. Particle size is frequently categorized as respirable (less than 10 micron), fine (greater than 10 and less than 100 micron), and coarse (greater than 100 and less than 1,000 micron) dust. Particles larger than 1,000 micron are frequently classified as trash, chaff, hulls, etc. The number of particles generally decreases exponentially with increasing particle size.

The explosibility of grain dust particles is related to its compositional properties of percent ash, water, and volatiles, excluding water. Explosibility generally decreases with increasing percentages of ash and water and the explosibility of dust particles also decreases with increasing particle size.

The minimum explosive concentrations for grain dust are typically 50 to 150 grams per cubic meter. The minimum ignition energy is typically reported to be 10 to 100 milliJoules. If a pile or layer of combustible dust is ignited without stirring or mixing with air, the dust is not likely to explode because oxygen is limited and the pile will only smolder or burn. Wheat and corn dust have high explosibility properties compared to other cereal grains, and historically, the records show that corn was the source grain most frequently involved in grain dust explosions in the United States.

Dust cloud generation is related to the residual dustiness of grain, the specific handling process, and the overall design of the handling facility. Residual dust is the respirable, fine, and coarse dust fractions in the grain mass or adhering to kernel surfaces. About 90 percent of the residual dust is organic combustible particles. Most of these particles are created by abrasion and impact during harvesting, handling, and storage. Other components (about 10 percent) include sand and dirt and even traces of particles from the equipment used in harvesting, handling, and storage.

Most grain kernels are naturally coated with an oil or wax that tends to retain respirable and some fine dust particles (less than 50 micron) on the kernel's surface. These naturally retained particles are not effectively removed by mechanical cleaning or air aspiration. When kernels are moved or stirred, abrasion and impact occur among kernels and against other objects. When kernels are abraded and impacted, a portion of the residual dust enters the surrounding air and moves with the air until the particles settle or impinge on another surface. The handling method determines the degree of abrasion or impact while the air handling system and facility design determine air movement and suspended dust concentrations at the point of abrasion and impact. Suspended dust concentration is a key to prevention of grain dust explosions. One method of preventing dust explosions is to maintain the suspended

dust concentration below that required for an explosion to occur even if oxygen and ignition sources are present. As mentioned earlier, the minimum explosive concentration for grain dust is approximately 50–150 grams per cubic meter.

There are three basic methods of dust control used in grain handling, and they are frequently described as housecleaning, pneumatic systems, and liquid additives. These methods must be used in combination, as none are independently sufficient by today's standards.

Pneumatic dust control systems are used to control dust cloud concentrations with forced air movement and separate the control dust from air streams with bag-house filters or cyclone separators.

Housecleaning is required to remove dust that escapes the pneumatic system or otherwise settles on stationary objects.

Liquid additives are used to increase the bond between dust particles in the grain or larger particle surfaces. The liquid additives are used primarily to minimize the respirable dust and some fine dust emissions. Mineral oil, soybean oil, and water are potentially effective liquid additives.

The pneumatic dust control systems are expensive to install, operate, and maintain. The design of pneumatic dust control systems is complex and the logistics of incorporating air streams, collection points, and recombinant systems in existing facilities is frequently difficult. Operation and maintenance costs of pneumatic systems are substantial. The pneumatic systems do not fully eliminate the need for housecleaning and the disposal of the separated dust must also be addressed.

The liquid additive application systems can be installed and operated at a fraction of the cost of pneumatic systems. Liquid additives also reduce respirable and some fine dust emissions. Liquid additives can reduce but cannot fully eliminate the need for housecleaning and pneumatic systems. Liquid additive application systems must include application rate controls and provide adequate grain surface coverage. Oils of appropriate grade and viscosity must be used, and water cannot be used when grain or air temperatures are near or below freezing.

For some end uses, repeated oil applications reduce the functionality, acceptability, and end-use value of the grain. Inappropriate application or repeated applications of water may cause detrimental biological or microbial activity in the grain.

Several factors can indirectly influence grain dust generation, emission, and control needs. For example, shelled corn is frequently the source material for grain dust explosions. Corn breakage and breakage susceptibility can be reduced in several ways and thereby indirectly reduce dust generation, emission, and control needs. Other indirect factors applicable to shelled corn are drying temperatures, environmental conditions at harvest, varietal characteristics, oil content, drop height, impact velocity, and grain temperature and moisture content at time of handling. Similar and other indirect factors apply singularly or in combination to govern the dust control needs for other grains.

The use of liquid additives to reduce grain dust dates back to 1951, when Moen and Dalquist patented the use of an edible mineral oil emulsion for this purpose. They found that applying 300 to

800 parts per million of mineral oil to grain effectively reduced dust emissions in subsequent handling. Based on ARS research, it was found that mineral and soybean oil treatments were effective in reducing dust emissions from corn and wheat. The treatments remained effective on grain stored 12 months after treatment. Full-scale field tests confirmed the practicality and effectiveness of mineral oil, soybean oil, and mineral water in suppressing the emissions of fine dust from corn, wheat, and soybeans.

ARS observations found no detrimental effect on the quality of corn, wheat, and soybeans when treated with 800 parts per million or less of mineral or soybean oil. The recommended application rate for mineral or soybean oil is 200 parts per million and the need for repeated applications should be minimal.

In recent years, the use of oil additives on grain has increased. The grain industry has adopted the use of oil additives to control dust as an alternative to more costly methods of reducing risks and meeting clean air regulations. For some end uses, grain treated with oil may be less functional and acceptable. Wheat treated with oil has been reported to cause operational problems in milling and reductions in flour quality. Detrimental effects in wet milling and malting have also been reported, and as a result, some preferences for not using oil additives have surfaced.

The Andersons of Maume, Ohio have a patent for suppressing dust emissions from food products using water. In 1982, ARS and others studied the use of mineral oil, soybean oil, and water as surface applied additives to control grain dust. Surface applications of small amounts of water were found to be effective in controlling dust emissions. As with oil, the effectiveness increased with increased application rate. An optimum application rate for water was not apparent in these studies, since the highest application rate studied, 3,300 parts per million, gave the best control. But this rate also was observed to cause grain kernels to stick to one another and to stationary surfaces with low angles of incline.

This observation suggested that less than 2,000 ppm should be applied at one time or application point; otherwise, the grain flow would be retarded and would eventually be stopped. Flow retardation due to wetting with water is somewhat of a natural deterrent to overapplication of water at a single point. However, if such amounts of water are added at subsequent points, the overall moisture level may begin to exceed that required for safe storage.

In effectiveness tests of water versus oil using the same lot of grain, single applications of water at 400 ppm and based on dustiness drop tests was not as effective as 400 ppm of oil. Based on dust concentrations measured at field locations, the application of 3,000 ppm of water gave nearly the same control as 300 ppm oil. A major difference between oil and water applications for dust control is that the residual effectiveness of water diminishes rapidly with time after application. A portion of the applied water vaporizes into the air and a portion is gradually absorbed into the grain kernels and particles. The dust control effectiveness of water applied at 2,000 ppm may last no longer than 15 seconds and approximately one-half of the applied water is absorbed by the grain.

Most of the absorbed water is initially contained in the broken and fine-grain materials, based on observations by Charles Martin, an agricultural engineer with the Agricultural Research Service.

Since the effectiveness of water may be lost rapidly and high application rates cause problems, multiple applications of lesser amounts at high dust emission points could improve overall dust control in a given facility. The total of all multiple applications per handling should be limited to 2,000 to 3,000 parts per million. Where grain is handled repeatedly after water application and short storage periods, repeated applications of water should not be permitted if the grain moisture content approaches or is above long-term safe storage moisture levels.

If repeated water additions increase grain moisture content above safe storage levels, then the increased biological activity is at risk. When grain moisture remains below that for safe storage, the consequences of repeated short-term surface moisture cycles in primarily the broken and fine materials may not be sufficiently documented. In the latter case, greater than expected biological activity and potential contamination in the broken and fine materials is possible and must be considered.

Mr. Chairman, this completes my prepared statement, and I would be pleased to respond to any questions.

Senator DASCHLE. Thank you, Dr. Steele. We appreciate your comments and we will have some questions for you. I will proceed as we always do in this subcommittee with all of the statements, and then we'll begin the discussion.

Mr. Galliart.

STATEMENT OF DAVID R. GALLIART, ACTING ADMINISTRATOR, FEDERAL GRAIN INSPECTION SERVICE, U.S. DEPARTMENT OF AGRICULTURE, ACCOMPANIED BY KAY STANG, COMPLIANCE DIVISION, AND DAVID R. SHIPMAN, DIRECTOR, FIELD MANAGEMENT DIVISION, U.S. DEPARTMENT OF AGRICULTURE

Mr. GALLIART. Mr. Chairman, Senator Craig, for further information, Mr. Shipman is the director of our Field Management Division. Mr. Stang is with our Compliance Division and he has been working with the Office of Inspector General in our investigation of applying water to grain.

I will summarize my statement and the full statement will be made available for the record.

We appreciate the opportunity to discuss the use of water to control grain dust. Unquestionably, liquid additives can suppress grain dust, but the problem with water is not in its theoretical effectiveness, but rather how it is used today and how it may be used tomorrow. There is a growing concern throughout the grain industry about the true purpose of using water to control grain dust and the net effect of the practice on grain quality. Some, including FGIS, believe that water is often used to increase weight. We now fear that unless prompt action is taken, current economic pressures may encourage even more elevators to adulterate grain with water.

With FGIS' assistance, the USDA Office of the Inspector General and the Department of Justice are currently investigating several suspected incidents of applying water to increase weight. They

have encountered sophisticated as well as primitive application methods, both resulting in weight gain. While it is difficult to assess how many of the over 10,000 grain elevators in this country apply water to grain, FGIS is concerned that the number is growing due to economic pressure and apparent lack of industry or Government control.

As the number of water users increases, so will the probability for abuse. For this reason, FGIS proposes a prohibition on applying water to grain except for certain processing purposes. We proposed this action after careful consideration of available alternatives and the impact of elevator safety.

Senator Daschle, I come here today with a very clear understanding of the dangers of grain dust explosions. This is a serious issue for the grain industry and FGIS alike. In 1977, there were 20 grain elevator explosions resulting in 65 deaths and 84 injuries. Fifteen of those who died were FGIS employees.

Fortunately, since 1977, the number and magnitude of dust explosions has significantly declined due to a greater safety awareness and better engineering. Smoke and heat detectors, improved bearings and buckets, blowout panels and vents, fire and explosion suppression systems, improved cleaning techniques, and better dust control methods have contributed to a safer working environment.

All of the 63 active export grain elevators in the United States have pneumatic dust collection systems. Nineteen also rely on liquid dust suppressants. Of the 19, 16 use mineral or vegetable oil and the remaining 3 use water.

The quality impact of——

Senator DASCHLE. Could I just clarify that? How many did you say there are, total?

Mr. GALLIART. Sixty-three active export grain elevators.

Senator DASCHLE. Sixty-three active export grain elevators and three use water today?

Mr. GALLIART. That's correct.

The quality impact of adding water to grain is influenced by the condition of the grain, the method of storage, and the storage temperature. Under the best conditions, you are increasing the potential for mold growth and reduced storability when water is added.

The practice of adding water to grain is of special concern to overseas buyers. Soybean processors in Europe and Japan have expressed concern over the practice of adding water to grain because of potential quality problems and for fair trade reasons. Foreign trade groups and the U.S. exporters have asked FGIS to prohibit the addition of water to grain.

Adding water to grain increases the weight of grain, but not its value. This invites tampering and misuse of water systems to increase profit. FGIS believes that the ongoing OIG–Justice Department investigation will confirm that some grain elevators are applying water to grain in a manner inconsistent with sound dust control practices. The result is that facilities using water increase their stocks, while most grain elevators experience a shrinkage in grain stocks because of drying and handling.

Preventing this practice with current rules has been limiting. Efforts to enforce the Food and Drug Administration rules have been largely unsuccessful because of the difficulty in proving intent, de-

fining a small amount of water added to grain for safety purposes, and distinguishing the process of applying water for safety purposes from adulteration. FGIS rules for the most part require a disclosure statement when water is applied. They do not regulate application.

Several industry groups and individual firms have recommended that FGIS regulate, rather than prohibit, the addition of water to grain for dust control purposes. FGIS has concluded regulation would not effectively prevent misuse and would create an economic incentive for all companies to apply water whether or not it is needed for dust suppression purposes.

FGIS also considered alternatives, such as requiring the deduction of water weight from grain weight, limiting the water application, and restricting water application to certain locations and conditions. The agency determined that any program to control or restrict water usage would be difficult and expensive to administer, require a significant staff commitment, and even then, could not effectively prevent all abuses.

Some have suggested marketing grain on a dry matter or standardized bushel basis instead of prohibiting or regulating the use of water. According to Dr. Lowell Hill of the University of Illinois, and I quote, "Buying grain on this basis would remove the economic incentives for adding water to grain."

FGIS encourages industry consideration of such market reform as an alternative to a direct prohibition, but I must emphasize, this is a marketing issue outside of FGIS's authority.

In conclusion, Mr. Chairman, grain dust is hazardous and controlling it is essential. But applying water to grain poses a risk to grain quality and could harm the integrity of U.S. grain exports by providing a strong incentive to increase weight. There are alternatives to water that are proven and effective methods for controlling grain dust. We believe our proposal to prohibit the addition of water to grain reflects current market needs, would have a positive economic impact on the U.S. grain industry, and would ensure the integrity of U.S. grain in domestic and international markets.

Mr. Chairman, this concludes my summary statement. I would be pleased to respond to any questions. As I indicated earlier, Mr. Stang is present and willing to answer questions about the investigation.

[The prepared statement of Mr. Galliart follows:]

PREPARED STATEMENT OF DAVID R. GALLIART, ACTING ADMINISTRATOR, FEDERAL GRAIN INSPECTION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman and members of the subcommittee: I am David R. Galliart, Acting Administrator of the U.S. Department of Agriculture's (USDA) Federal Grain Inspection Service (FGIS). I am joined today by David Shipman, Director of FGIS' Field Management Division. We appreciate the opportunity to discuss our views regarding the use of water to control grain dust.

For the past 13 years, FGIS has followed closely the various industry groups, researchers, and other Government entities that have studied the efficacy of various grain dust suppressants, including water. And, without a doubt, liquid additives can suppress grain dust. But, the "problem" with water is not its theoretical effectiveness, but rather how it is actually used today and how it may be used tomorrow.

Throughout the grain industry, there is growing concern about the true intent and net effect of using water to control grain dust. Producers, elevator operators, exporters, importers, and processors are concerned about the effect that water has

on grain quality. And, some believe—as does FGIS—that it is often used to increase weight.

This problem is not new. Major industry groups and companies have tried, without success, to address this issue. These groups now fear that, unless prompt action is taken, current economic pressures may encourage even more elevators to adulterate grain with water. These fears seem well grounded.

With FGIS' assistance, the USDA's Office of the Inspector General (OIG) and the Department of Justice are currently investigating several suspected incidents of improper water use. That is, applying water to increase weight. Let me share with you some of their findings:

- An elevator blending dustlike foreign material with soybeans and then spraying water on this mixture, which caused the foreign material to adhere to the grain and avoid detection;
- Elevators applying water to grain with fire hoses and thick unnozzeled pipes or repeatedly applying water to the same grain until it reaches the maximum moisture level allowed by contract; and
- A barge of grain in which so much water had been added that the grain froze and seriously damaged elevator handling equipment.

It is not known how many of the 10,000-plus grain elevators in this country apply water to grain. But we are concerned that the number is increasing due to economic pressure and the apparent lack of control by industry or Government entities. As the number of water users increases, so will the probability for abuse. For this reason, FGIS proposed a prohibition on applying water to grain, except for milling, malting, and similar processing operations. Today, I would like to briefly update you on this proposal and to address your questions regarding the use of water to control dust.

THE SAFETY ISSUE

Grain dust is created by the impact or abrasion of grain and includes bran flakes, fine broken brush hairs, particles of endosperm, weed seeds, pieces of chaff and straw, and soil. This dust is so fine that it easily becomes suspended in air and, as a result, can become fuel for potentially disastrous grain elevator explosions. Such explosions can shatter concrete bin walls and even lift bins of grain weighing hundreds of tons off of the ground. Fortunately, since the late 1970's, the number and magnitude of dust explosions has significantly declined. In 1977, there were 20 grain elevator explosions resulting in 65 deaths and 84 injuries. Fifteen of those who died were FGIS employees. In 1992, there were eight explosions, with one death and two injuries.

There are two key reasons for this dramatic turnaround: better engineering and greater awareness. Today, grain companies educate their managers and employees about the risks of dust explosions. Practices that were commonplace 15 years ago, such as smoking in elevators, are now prohibited by company policy and the Occupational Safety and Health Administration (OSHA). Elevators also have a wider variety of "tools" at their disposal. These include better smoke and heat detectors, improved bearings and buckets, blowout panels and vents, fire and explosion suppression systems, improved cleaning techniques, and better dust control methods.

An overview of export elevator dust control programs helps focus this issue. Of the 63 active export grain elevators in the United States, all have pneumatic dust collection capabilities, which vary greatly in design and operation. Nineteen (30 percent) also rely on a liquid dust suppressant, 16 (25 percent) use mineral or vegetable oil, and 3 (5 percent) use water.

Suppressing dust with oil and water is an "old" idea. Some industries, such as coal mining, have been using liquids to suppress dust for well over 100 years. For the past 13 years, FGIS has closely followed grain industry research of dust suppressants. In the early 1980's, FGIS oversaw the development of one of the first oil/water dust suppression systems at an export facility. The system was developed to suppress atmospheric dust emissions, not to reduce dust levels within the elevator itself, by spraying oil or water on the grain just before it left the load-out spout. The grain was weighed before the additive was applied, and a special statement regarding the application was placed on the inspection certificate to ensure that all interested parties knew of the application.

Several years later, the National Grain and Feed Association initiated a study, which was conducted by the USDA's Grain Marketing Research Laboratory, to determine the effectiveness of oil and water as dust suppressants within the confines of an elevator. This research culminated in the publication of the report, "Examining the Use of Additives to Control Grain Dust" (1982, Lai, F.S.; Martin, C.R.; and

Miller, B.S.). This report clearly shows that additives that are applied properly and at the correct locations can reduce fugitive grain dust. Specifically, the research found that water applied at a level of 0.3 percent to corn reduced the dust concentration by approximately 80 percent, on the gallery floor. At the same location, soybean or mineral oil applied at a level of 0.05 percent reduced dust by more than 90 percent. Far less oil controlled the same amount of dust. More importantly, oil adheres to grain, thereby providing longer-term dust suppression. Water, on the other hand, is either absorbed into grain or evaporates. To be effective, water must be repeatedly applied or used in conjunction with other dust control measures. But, if too much water is added, the grain will spoil and lodge in the bins requiring manual extraction, a dangerous process. In addition, wet grain often adheres to and cakes enclosures around belts and buckets. This increases the static electricity in these enclosed areas, which can become an ignition source for a dust explosion.

GRAIN QUALITY DEGRADATION AND WEIGHT PROBLEMS

Adding water to grain creates favorable conditions for microbial contamination, which can, in turn, lead to heating and caking in extreme cases. Moisture is the major factor in grain storability, chiefly because of its influence on the growth of storage fungi. The number of days that grain can be safely stored decreases as the moisture level of the grain increases.

It is impossible to accurately predict the level at which the addition of water will cause quality degradation. Many variables influence the impact that added water has on grain quality, including the condition of the grain, the method of storage and the storage temperature. Adding 0.3 percent of water, by weight, to grain may not significantly affect high quality/low moisture wheat when the ambient temperature and humidity are low. If, however, the grain is of poorer quality, or it has a higher internal moisture, or the temperature and humidity are high, then even a very small increase in moisture may cause the grain to spoil. Further, when water is added to grain, it is generally not distributed equally throughout the entire grain mass. Some kernels are soaked, while some are left dry, resulting in nonuniform quality and "hot spots" throughout the mass.

The practice of adding water to grain is especially troublesome to overseas buyers. In a letter to FGIS, Dr. C.J.M. Meerhoek, Executive Director of the European Community Seed Crushers and Oil Processors Federation (FEDIOL), said that, "Spraying water for dust suppression is considered to be an undesired practice * * * for quality reasons [and] for 'fair trade' reasons." Mr. Mitsuo Kurashige, Director of the Japan Oilseed Processors Association (JOPA), told FGIS that adding water to grain "does influence the accuracy of foreign material analysis and accordingly affects the differences of foreign material content between loading and unloading analysis." And, the Mielieraad Maize Board (South African corn importer) notified FGIS that, because of possible water-related quality problems, they will no longer purchase corn from U.S. export ports where water is added. These groups, as well as many U.S. companies, have asked FGIS to prohibit the addition of water to grain.

Adding water to grain increases the weight of grain without adding to its value. This invites tampering and misuse of water systems to increase profit. Adding as little as 0.3 percent water, by weight, can significantly enhance the small margins the grain industry operates under. For example, by applying water at a 0.3 percent rate to a 50,000 metric ton (mt) shiplot of wheat, an exporter could (excluding subsequent evaporation) add 150 mt of water to the shipment. If the wheat was sold for $128 per mt, the water could generate over $19,000 in additional profit for the shipper.

FGIS believes that the ongoing OIG/Justice Department investigation will confirm that some grain elevators are applying water to grain in a manner inconsistent with sound dust control practices. Investigators have found elevators applying water at wrong locations, with improper equipment, and at excessive rates. As a result, whereas most grain elevators experience a shrinkage in grain stocks because of drying and handling, facilities using water inappropriately have increased their stocks.

ENFORCEMENT OF CURRENT RESTRICTIONS

Proponents for applying water to grain suggest that misuse can be effectively controlled by enforcing current Food and Drug Administration (FDA) and FGIS rules and restrictions. Unfortunately, rules regarding this practice are difficult to enforce or are not applicable to most situations. The FDA, the agency primarily responsible for preventing adulteration, continues to adhere to a policy articulated by former Associate Commissioner for Regulatory Affairs Joseph P. Hile, in August 1980:

> * * * the intentional addition of water to grain would appear to violate the Federal Food, Drug, and Cosmetic Act, which prohibits the unnecessary addition of water to food. Under section 402(b)(4) of the act, a food is deemed to be adulterated 'if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength or make it appear better or of greater value * * *.' If we encounter [grain] adulterated with water, we will consider appropriate regulatory action. We recognize that it may be necessary for an elevator to add small amounts of moisture to grain for safety reasons * * *. The addition of moisture to grain for safety reasons is quite a different matter * * *.

Efforts to apply FDA's policy have been largely unsuccessful because of the difficulty in proving intent, defining "small amounts" of water, and distinguishing the process of applying water for safety purposes from adulteration.

Within the past 6 years, FGIS published two regulations that address certain aspects of additive applications. In 1987, FGIS promulgated regulations specifying that if additives are applied during loading to outbound grain after sampling or weighing, or during unloading to inbound grain before sampling or weighing for the purpose of insect or fungi control, dust suppression, or identification, the inspection and/or weight certificate must show a statement that describes the type and purpose of the additive application. These regulations, however, only apply to officially inspected or weighed grain and do not limit the application or restrict the usage of water.

Earlier this year, FGIS amended the regulations under the United States Grain Standards Act to require a disclosure statement on official export inspection and weight certificates whenever water is applied to export grain at export port locations. It has been suggested that a similar requirement be established for domestic grain. But, unlike exports, domestic grain shipments are not required to be officially inspected and weighed. Only an estimated 10 to 25 percent of all domestic grain shipments are officially inspected or weighed.

REGULATING WATER USAGE

Several industry groups and individual firms have recommended that FGIS develop a program for regulating—rather than prohibiting—the addition of water to grain for dust control purposes. Last spring, a grain company that is currently using water for dust control purposes suggested establishing a permit or licensing program to control water applications. FGIS considered the permit suggestion and concluded the process would not effectively prevent misuse and would create an economic incentive for all companies to apply water whether or not it is needed for dust suppression purposes.

The effectiveness of a permit system is compromised because FGIS cannot rely on after-the-fact product testing to verify proper application. It is technologically impossible to test grain and distinguish naturally occurring moisture from applied or added moisture. Consequently, a permit system must rely on an elaborate set of specifications involving water sources, application rates, metering devices, inventories, and the like. And while FGIS could evaluate an initial system and approve its installation, opportunities to override computer monitoring would exist with increased incentives to exploit any loopholes. Follow-up audits of systems would be time consuming, expensive, and minimally effective.

The current task of proving *intent* to increase weight would shift to proving *intent* to alter the approved system. Would a malfunctioning nozzle be an inadvertent mishap or intentional circumvention of the system?

We estimate that the annual cost of a permit system would quickly exceed $1.5 million as more and more elevators are economically forced to apply water under the premise of dust suppression. And what is achieved by spending this money: creation of a Government-controlled program that will encourage grain handlers—even farmers—to apply water to grain. It is a program that will not be able to prevent willful abuse.

FGIS also considered several other alternatives such as requiring water weight to be deducted from grain weight, limiting the rate of water application, and restricting water applications to certain locations and conditions. The Agency determined that any program for controlling or restricting water usage would be very difficult and expensive to administer, require a significant staff commitment and, even then, could not effectively prevent all abuses.

MARKETING GRAIN ON A DRY MATTER BASIS

The concept of revising or reforming marketing practices to eliminate the economic incentive for adding water to grain has also surfaced as members of the grain industry have debated the consequences of adding water to grain. Several have discussed the benefits of marketing grain on a "dry matter" basis. According to Dr. Lowell Hill of the University of Illinois, a leading proponent of the "dry matter" or "standardized bushel" concept:

> Buying grain on the basis of a standardized bushel has several advantages. *Perhaps the foremost is that it removes the economic incentives for adding water to grain.* The Food and Drug Administration would no longer need to concern itself with enforcement of the unenforceable regulation relating to the addition of water to increase value. Most of the impetus for state regulation relating to moisture content of grain would also be eliminated. Price premiums would not be needed for overdry grain since moisture content would be used to determine quantity, not price. The elevator would no longer have to monitor grain deliveries to identify grain with water added. Charges and discounts would be explicit rather than incorporated into a combined weight-price adjust factor.

FGIS believes that the industry should consider viable market reforms, such as the "standardized bushel" basis, as an alternative to direct prohibition of applying water to grain. But, whether this or any other reform should be adopted is a marketing issue outside FGIS' authority. FGIS is uncertain how to achieve any such market reform or ensure market discipline.

While the "standard bushel" concept is not an "FGIS issue," we offer some general observations on how a system might impact on inspection and weighing. Implementation of the "standardized bushel" would require accurate weighing and moisture measurement of all U.S. grain. The majority of elevator weighing systems appear adequate for this task; most moisture meters probably are not. Current moisture measurements are most critical at the base market level; e.g., 15.0 percent for corn and 13.0 percent for soybeans. But under the "standardized bushel" concept, all levels of moisture would have equal value since it would be directly tied to each market transaction. Hence, the results must be accurate throughout the entire moisture range.

For the "standardized bushel" concept to deter misuse of water, moisture meters must not only be accurate, but must also be able to detect and measure externally applied water. Available literature indicates that the accuracy of currently used dielectric moisture meters are compromised if measurement occurs too soon after the application of water to the grain. A recent FGIS test demonstrated that when 0.3 percent of water is added to 11.97 percent moisture wheat, the moisture meter initially determined the wheat's moisture to be 12.63 percent. The results gradually decreased to the expected level of 12.27 percent over a 110-minute period.

CONCLUSION

Grain dust is hazardous and controlling it is essential. But, applying water to grain poses a risk to grain quality and significant harm to the integrity of U.S. grain exports by providing a strong incentive to improperly increase weight. There are alternatives to water that are proven and effective methods for controlling grain dust.

It is imperative that both domestic and foreign buyers are confident that U.S. grain is pure and unadulterated. The perception that some U.S. grain shippers are applying excessive amounts of water to grain jeopardizes the reputation of all U.S. grain and the grain industry's commitment to quality. To undergird this commitment, the USDA has published a rulemaking action that proposes to prohibit the application of water to grain with certain limited exceptions. We believe that this proposed action reflects current market needs, would have a positive economic impact on the U.S. grain industry, and would ensure the integrity of U.S. grain in domestic and international markets.

Senator DASCHLE. Thank you, Mr. Galliart.

I know that Mr. Stang did not come with any anticipation of an opening statement, but I think this would be an appropriate place, having now heard the two USDA witnesses, if I could just ask you to give us some appreciation of the findings of your investigation,

and elaborate, if you could, on some of the things Mr. Galliart said. Could you do that for us?

Mr. STANG. Yes, sir. My name is Kay Stang. I am a compliance officer for the Federal Grain Inspection Service. I have, sir, Exhibits A through J that I would like to enter into the record.

Senator DASCHLE. Without objection, they will be made a part of the record as well.

[The Exhibits are retained in the committee hearing file.]

Mr. STANG. The USDA investigation conducted by the Inspector General's Office and assisted by representatives from the Agricultural Stabilization and Conservation Service and the Federal Grain Inspection Service into the application of water to grain shows that elevators often fail to use the water system as designed for controlling dust at critical safety points, but rather exploit the system's capability to increase grain weight.

This task force discovered the use of fire hoses to apply a steady stream of water to grain on conveyor belts, in elevator legs, and in elevator spoutings. Exhibits A and B show an elevator where a fire hose was attached to the pipe coming over the top of the elevator. Water was pumped through that pipe; the water hose was connected to that pipe. It was inserted through a removable plywood panel on top of the elevator, where the fire hose was inserted into the conveyor belt and applied a high volume of water directly to grain before it was loaded into the storage bin.

According to elevator personnel, the grain would be held at this high moisture, allowing time for surface moisture to equalize, and then was blended out with dryer grain to maximize allowable market moisture levels at load-out.

Additionally, we discovered water applications being concealed in false spoutings. This is Exhibit C.

Senator DASCHLE. Would you mind if Senator Craig and I examine those as you go through?

Mr. STANG. No, sir.

Senator DASCHLE. If you would just pass those over, that would be appreciated.

Mr. STANG. Exhibit C is the false grain leg that was there to conceal the water pipes in that particular house.

Exhibit D shows another location where water can be applied to grain with a fire hose. This also shows how easy it would have been to circumvent any effort to regulate the water application.

Senator DASCHLE. Could you explain that just briefly, why would it be difficult?

Mr. STANG. This water hose is in connection with a controlled computer-operated system. This operates completely outside any monitoring effect that we would have unless we were on site and monitoring the application. Also, the effort to prove intent as to whether this water hose was being applied at any given time for cleanup purposes or whether the water was being applied to the grain stream, without our being present to witness, is very difficult.

Additionally, we also repeatedly found dust suppression systems being misused. For example, application points were disconnected at critical dust control points, such as at the bottom of a leg at the truck dump before the grain is elevated into the elevator. Our ex-

amination found that the nozzle was completely disconnected and was inoperable upon our visit.

Secondly, at the top of the leg, when this grain was put on a conveyor for distribution to the bins, we found an open pipe. The pipe was approximately 1 inch reduced down to three-quarters, from which the nozzle was completely missing, and a steady flow of water was being applied to the grain.

In addition, we found poor housekeeping policies and practices in effect at many of the facilities that use water. Excessive buildup of caked material around the pulleys and bearings could possibly create additional safety hazards. Here we have a motor-driven pulley at the end of an export belt that is almost completely encased with the caked material.

Senator CRAIG. You're suggesting there, Mr. Stang, overloading, overheating?

Mr. STANG. Possibilities of that, yes, sir.

Senator CRAIG. Okay.

Mr. STANG. We also took into consideration the market impact of applying water to grain. The task force found the following: Exhibit G shows moisture levels of outbound corn shipments from two elevators located in the same area. Both elevators purchased grain from the same production area. One elevator has a water dust suppression system; the other does not. On the average, the elevator with the water system had moisture levels 1 percent above the other on their outbound shipments.

Exhibit H illustrates the impact of water application on railcar load-outs for corn shipments at one facility. The frequency distribution marked by A shows the inbound moisture for all grain received at this facility according to warehouse receipts.

Distributions B, C, and D show the moisture levels for railcar load-outs when water was reportedly applied, again showing approximately a 1-percent moisture weight increase.

Distribution E shows the load-out moistures after our investigation team visited the facilities and water application was suspended.

A 1-percent moisture gain represents one-half pound weight gain per bushel for 56 pounds of corn, or 2.5 cents per bushel for $2.50 corn.

Senator CRAIG. Advantage?

Mr. STANG. Advantage, yes, sir.

Senator CRAIG. That is what you are saying by that.

Mr. STANG. Now I'd like to analyze some warehouse records. While most elevators struggle to minimize stock losses due to handling, the facility in Exhibit I had stock increases. We believe these increases are closely related to water application. On the exhibit, years one and two were before our investigation began, year three is a partial year after the investigation, and year four is a full year since the investigation. Please note the substantial decline in stock growth since the investigation began.

The task force also was concerned about the impact of water application on grain quality. There are many variables, as previously mentioned, that influence whether the application of water to grain can create a quality problem. The original moisture level, grain condition, and temperature all play a role. However, it is fair

to say that adding water to grain increases the possibility of incurring quality problems, especially as elevators strive to hit the corn moisture target level of 15 percent on their outbound grain.

Exhibit J illustrates the difficulty encountered with 40 cars from a 65-car unit train loaded at a facility which applies water. Obviously, grain facilities encounter quality problems whether or not water is applied. However, the spoilage encountered on this particular train would have been much less if the water was not applied, in our opinion. This shipment was officially inspected at both origin and destination. However, due to spoilage during transit, 24 cars were rejected at destination as unfit for human consumption.

Senator DASCHLE. Are you confident that those cars were not fit simply because of the addition of the water?

Mr. STANG. I am saying that hitting the application of water on the target level at 15 percent may have caused significant migration and damage. The damage was mostly surface mold.

Additionally, I would like to explore a couple of other things that happen when water is applied to grain. The task force found one facility that had two large, flat storage warehouses completely filled with ground, toasted soybean hulls, some of which were imported from Canada, Exhibits K and L.

The facility was wetting the ground soybean hulls and adding them to the soybeans. We believe this practice was used to increase the soybean FM level to 7 percent, which allowed the exporter to blend to the maximum 2 percent typically used for export shipments and stick the fine FM to the soybeans, which may go undetected using conventional FM measurement procedures. In this case, an export elevator was contracting and paying a premium for high FM and also contracting for high moisture soybeans from this facility.

That concludes my remarks.

Senator DASCHLE. Thank you very much, Mr. Stang.

Mr. Botos, thank you for coming.

STATEMENT OF JOSEPH BOTOS, VICE PRESIDENT, CARGILL, INCORPORATED

Mr. BOTOS. Thank you.

Mr. Chairman and members of the subcommittee, I am Joe Botos, a vice president with Cargill, Incorporated. Cargill's businesses include grain export and handling, and we are also processors of soybeans, corn, wheat, and we manufacture animal feeds and are in a variety of other businesses.

I oversee Cargill's environment, health, and safety policies, procedures, and practices at more than 800 facilities worldwide, including the workplace health and safety of Cargill's 67,000 employees. I come to this position after 24 years in grain operations. Safety and grain quality issues have been central concerns during my career at Cargill.

As a result, I have thought a lot about the interactions between plant and worker safety, environmental protection, and grain quality, and I am pleased to testify on the proposal to ban the addition of water to grain. Cargill fully supports the reauthorization of the Federal Grain Inspection Service. We also have long supported and

worked for a complete ban on the addition of water to grain. We favor the adoption of the proposed rule banning water-add that the Federal Grain Inspection Service has published for comment. We believe that rule reflects the prevailing consensus and practice of the grain industry.

We also would support a legislated ban that would extend the Federal Grain Inspection Service standard to segments of the industry not subject to supervised inspections.

Cargill opposes the addition of water to grain for the following reasons: It can be harmful to grain quality. It is neither a necessary nor a prudent elevator management practice for minimizing risk of grain dust explosions. There are other better means for dealing with the environmental risks of fugitive dust emission, and it is inherently difficult to regulate without undermining the integrity of the United States grain handling systems.

In the interests of time, I would like to submit for the record a paper entitled, "Water-Add in Grain," which provides a detailed explanation for the conclusions I have just expressed. I will attempt to summarize the points in that paper briefly here and will refer to it in answering specific questions the subcommittee may have.

Senator DASCHLE. Without objection, it will be made part of the record.

[Mr. Botos' prepared statement and the paper referred to follow:]

PREPARED STATEMENT OF JOSEPH BOTOS, VICE PRESIDENT, CARGILL, INCORPORATED

I am Joseph Botos. I am a vice president of Cargill, Incorporated, and manage the company's Environment, Health and Safety department. I oversee Cargill's environmental, health and safety policies, procedures and practices at our more than 800 facilities worldwide, including the workplace health and safety of the 67,000 people who work for Cargill. Cargill's businesses include grain handling and export; wheat, corn and soybean processing; barley malting and animal feeds.

I come to this position after 24 years in grain operations. Safety and grain quality issues have been central concerns throughout my career at Cargill. As a result, I have thought a lot about the interactions between plant and worker safety, environmental protection and grain quality and am pleased to testify on the proposal to ban the addition of water to grain. Cargill fully supports the reauthorization of the Federal Grain Inspection Service. We also have long supported and worked for a complete ban on the addition of water to grain. We favor the adoption of the proposed rule banning water-add that the Federal Grain Inspection Service has published for comment. We believe that rule reflects the prevailing consensus and practice in the grain industry. We also would support a legislated ban that would extend the Federal Grain Inspection Service standard to segments of the industry not subject to supervised inspections.

Cargill opposes the addition of water to grain for the following reasons:

- It can be harmful to grain quality;
- It is neither a necessary nor a prudent elevator management practice for minimizing risks of grain dust explosions;
- There are other, better means for dealing with the environmental risks of fugitive dust emissions; and
- It is inherently difficult to regulate without undermining the integrity of the U.S. grain handling system.

In the interests of time, I would like to submit for the record a paper entitled "Water-Add in Grain," which provides a detailed explanation for the conclusions I have just expressed orally. I will attempt to summarize the points in that paper briefly here and would plan to refer to it in answering specific questions the subcommittee may have.

Cargill advocates banning the addition of water to grain. We have backed our words with action: we require sellers to warrant in writing that they have not added

water to grain sold to us, and we warrant to buyers that we have not added water to grain we handle. But, this is not a practice that realistically can be disciplined contractually. To deal effectively with this issue, Federal policy must be clear, and it must be easily and efficiently enforced. It must treat all parties equally under the rules.

Adding water to grain is detrimental to grain quality and storability. This problem was noted in the seminal 1982 study that looked at additives to suppress grain dust. That study reported that added water tended to collect in the dust portion of the grain stream. This concentration of the added water creates the conditions that promote mold growth and insect infestation, which limits grain storability and creates unnecessary quality risks.

Permitting but regulating water-add will lead toward repetitive applications of water to the grain stream because it both reduces handling costs and potentially increases revenues. Customers we buy from and sell to repeatedly express their concerns that problems from water-add will tend to accumulate as grain moves to final use. We believe that the comments to be filed in response to the proposed Federal Grain Inspection Service rule will clearly underline these concerns.

Proponents of water-add claim its safety benefits outweigh its quality risks. We disagree. Sound facility safety management is built around prevention, not partial fixes. Prevention means careful layout and design of plant and equipment, including: moderating speed of equipment; enclosing equipment; utilizing controlled venting; pressurization of equipment, and avoiding long free falls, sharp angles and steep inclines in the grain handling process. Design and layout should be supplemented with aspiration and air cleaning equipment at critical points, proper preventive maintenance and housekeeping practices and installation of heat sensing and motion detection equipment.

In other words, prevent problems from occurring. Water-add is not a substitute for these other measures and is at the bottom of any sound safety checklist.

Use of liquid additives has a value in reducing fugitive dust emissions to the surrounding environment. But food grade mineral oil is more effective than water-add in its initial application, does not require repetitive applications, does not create grain quality risks and is self-regulating. These benefits are largely environmental and should not be confused with the essentials of safe elevator management.

We also believe that the Federal Government cannot regulate the addition of water to grain; it must ban it. There is no practical way to detect water-add or to provide buyers with assurances of how much water was added in the course of the grain's movement from the farm to the ultimate consumer, when addition of water occurred, whether it was added in a uniform manner or whether the grain's subsequent storage and handling has created potential condition problems.

The fact is that no inspection system can do this for the entire U.S. grain handling system, including on-farm handling. It is neither physically possible nor economically sensible for the Federal Grain Inspection Service to do that when it is having to rationalize each dollar that it spends.

If the United States chooses to permit any addition of water to grain, addition of water at least up to that level will become the standard throughout the U.S. agricultural system. If it becomes permissible for one, competitive pressures will make it incumbent on all. America's reputation for grain quality and integrity as a supplier will be called into question.

We agree with the Federal Grain Inspection Service when they say they cannot regulate the practice of adding water today. We also believe that they cannot regulate it under other conditions—such as in systems where water weight is deducted from grain weight. Indeed, those systems create other problems for maintaining and ensuring grain quality. But, it is not necessary to get to that question.

Adding water to grain is potentially harmful to quality; it is vulnerable to abuse; it offers no assurances on safety that are not available through other, better techniques; and its environmental benefits are marginal and attainable in other, better ways. Since any program that attempts to oversee the addition of water to grain will end up compelling it, the better course is to ban the practice. That is what the Federal Grain Inspection Service has proposed to do. We believe they will do it and should be given the opportunity to do so.

Thank you.

WATER-ADD IN GRAIN

The Effects of Water-Add on Grain Quality

Cargill supports a regulatory ban on the addition of water to grain. We do not add water to grains we handle. Moreover, in our grain contracts we require sellers to warrant that they have not added water to grain. And, in our sales contracts we warrant that we have not added water to grain.

We have taken this stance because adding water to grain can damage grain quality and its storability. It can affect the way grains perform for our customers in processing. And it can create a perception among customers that would jeopardize the United States' reputation for ensuring grain quality.

Water obviously is a critical element in producing grain. It also is a critical element in many grain processing activities to make the products needed by industry and consumers. But, putting water on the outside of grain kernels as part of the grain handling process is the one point in the food chain where water is not needed and can be hurtful.

The reason is simple. Getting grain wet is deleterious to its quality. Water on a grain kernel promotes the growth of mold and other microbial contaminants. This is particularly true of broken or fractured kernels, which absorb a disproportionate amount of water. Moisture on grain kernels also promotes insect and rodent infestation.

These are not risks that begin after a certain quantity of water is added. Excessive moisture adds to the risk, but the risks begin building from the first application.

Risks to grain quality from water-add also are a function of what happens to the grain subsequently. If the grain moves quickly through the handling system, is aerated and cooled, is not subject to repeated additions of water and is soon processed, quality risks from water-add would be minimal. But, if grain is stored for a long period of time; if it does not receive good aeration and cooling; if it is put in a hot, humid environment that promotes deterioration; if water is added at a number of handling points, and if it is processed only after a long delay, the risks of quality deterioration escalate.

These latter conditions are widely prevalent in serving foreign customers. Grain can sit in vessel holds; it can move across climates to very hot, humid conditions; it is likely to be handled a number of times when water could be added; it can remain in storage for many months, and the delay between first handle and final processing routinely can be half a year or more. Since U.S. grains can move either to domestic or export markets, grain handling regulations need to be shaped to minimize quality risks not only in the best circumstances but also in the worst. Such assurance is especially important to the foreign buyer, who faces more risks of mishandling and who has readily available supply alternatives.

That is why we believe that adding water needs to be banned, not just regulated. The fact that it could be done under optimal conditions with little risk cannot be the test. The quality standard we must meet is the market's need where conditions are not optimal and where customers can turn to other suppliers outside the United States who do not add water.

The situation is different when grain moves from the handling system to the processing system. Once grain enters the processing system—flour milling, corn milling, barley malting, etc.—water is added as a part of the processing system to manufacture particular products. That process is continuous and carefully controlled by the processor. Recognizing this distinction, the proposed FGIS rule does not ban water-add in grain processing; it only bans it in grain handling.

The FGIS proposed rule also does not prohibit water as a carrier in the application of fumigants or insecticides. The quantities involved are minuscule—much less than would be necessary to provide some level of dust suppression, for example. And the application of fumigants and insecticides is more easily detected, monitored and controlled.

Cargill believes that the FGIS proposed rule to ban the addition of water is carefully and properly drawn. It reflects a careful weighing of the risks to grain quality and of the danger that even changes in the perceptions of America's reputation for grain quality could shift buying to other suppliers. We believe the proposed rule conforms to general industry practices, the consensus of views within the grain handling industry and the preference of most grain users.

Water-Add as a Safety Measure

Some people argue that water is an effective dust suppressant that guards against deadly grain elevator explosions and saves lives. In making this argument for not banning water-add, they assert that the safety benefits outweigh the quality risks.

To assess this argument, we need to review the causes of grain dust explosions and how those causes are best addressed. An analogy may be helpful here. If safety is the goal, is it better to try to keep something too wet to burn or is it better to prevent the fire by remedying the things that can cause it? We believe the latter course is the better and more responsible one.

Since the first grain elevators were constructed, there have been fires and explosions. But in the late 1970s and early 1980s, there was a sharp increase in the incidence of such disasters. In 1977 alone, there were 20 grain dust explosions in the United States. Eleven more took place in the next 2 years. In response, a concerted effort by Government and industry was undertaken to find ways to prevent future explosions.

Government and industry researchers found that a grain dust explosion required these elements:

- Grain dust suspended in air.
- Oxygen.
- An ignition source.
- A confined space.

Prudent elevator management seeks to reduce the amount of dust suspended in the air and to eliminate ignition sources.

The National Academy of Sciences (NAS) in a 1982 report recommended that the most cost-effective step to reduce explosions was improved control of grain dust within elevators through concerted housekeeping programs. NAS recommended automatic suction and manual cleaning systems be installed to remove dust from within closed elevator spaces, particularly elevator "legs," the portion of the facility through which grain is transported from ground level to the top of elevator silos. Today, these systems are in place in nearly every facility.

Careful layout of plant and equipment is the most effective safety measure. Designing in safety includes moderating the speed of equipment, enclosing equipment, utilizing cross-venting in a controlled manner, avoiding long free falls of grain, utilizing "dead boxes" and "choke feeds" and pressurizing equipment. These methods all enhance safety by keeping the dust embedded in the grain stream.

Supplementing good basic design by installing air cleaning devices, such as cyclones and fabric filter systems, and by aspirating at critical points in the handling process also may be needed.

When you combine careful layout and design with preventive maintenance and housekeeping practices, you have the critical elements of dust control. Dust control provides a cleaner and healthier place to work, reduces overall maintenance costs, lowers insurance costs, helps control insect and rodent infestation, reduces shrinkage and loss of product, improves operating efficiency, improves relations with neighbors and, importantly, minimizes fire and explosion hazards.

Additional industry steps to reduce dust explosions and to increase elevator safety include:

- Locating potential ignition sources, particularly elevator legs, outside the elevator, or installation of vents to relieve pressure where legs could not be moved;
- Widespread use of grain-industry-sponsored (National Grain and Feed Association and Grain Elevator and Processing Society) fire and explosion training programs;
- New OSHA grain handling standards, including electronic devices to monitor leg and belt-pulley speeds and temperature of bearings or the relocation of certain bearings outside of elevator legs;
- Locating (or venting) dust systems outside confined spaces;
- Use of inspection access points at head and tail of inside elevator legs;
- Pressure-drop gauges on dust control systems;
- An industry standard of no more than one-eighth inch of grain dust within 25 feet of inside elevator legs;
- Tighter regulation of grain dryers;
- Required housekeeping practices, including controls on the use of compressed air; and
- Required cutting and welding permits.

Grain elevators have become more automated, and more elevator tasks have been moved outside the elevator, reducing employee exposure to dust or safety risks.

More and better mechanical technologies are available to dry grain, convey it, suppress dust at spouts and remove it from legs. Management practices have improved. Many older and less safe facilities have been closed. All of these must be backed with sound safety training, since employees play the ultimate role in preventing explosions and in preserving lives.

This approach has worked. Improved dust control systems, elevator management practices, elevator retrofitting and redesign and employee education have sharply reduced the number and severity of grain elevator explosions and respiratory exposure to grain dust.

Using additives to suppress dust inside the elevator is not a significant component of an elevator safety program. Nor is it a substitute for these other steps. Prevention of problems is the proper management course, not reliance on partial fixes.

Additives to Reduce Environmental Pollution

While use of additives is not a necessary nor significant part of sound elevator safety management, we have learned that such additives can be a useful means of reducing fugitive dust emissions to the environment. Aspirating grain streams to control grain dust is still the baseline approach for reducing release of grain dust to the environment.

In fact, at our elevator in Portland, we handle 60–100 million bushels per year of the driest wheat produced in the United States. We use no liquid additives. Pneumatic dust control systems, properly designed equipment and use of enclosed equipment enable us to handle this dry grain without excessive dust emissions.

However, the addition of food grade mineral oil or vegetable oils also has proven an effective way to reduce dust emissions, especially in corn and, to a lesser extent, in soybeans and wheat. This technique is used particularly where proximity to neighbors makes controlling fugitive dust emissions to the air important.

Research has shown that addition of food grade mineral oil at the rate of 0.03 percent by weight to corn reduced dust accumulation on the gallery floor by 90 percent. The same tests showed that use of water at 10 times that rate was still less effective. The reasons for this difference are relatively straightforward. Food grade mineral oil adheres to the kernel better. Moreover, as the grain tumbles, it spreads more evenly across the kernel.

The relative performance of food grade mineral oil and water as additives to reduce environmental pollution diverge even further over time. Oil persists on the kernel while water tends to collect, condense or evaporate. Water has to be re-added time after time to even approach the environmental benefits of a single food grade mineral oil application.

There also are times when the high moisture content of grain makes it virtually impossible to add water and meet contract specifications. This makes water-add an even more limited tool for capturing the environmental benefits of lower fugitive dust emissions and further minimizes its role in promoting elevator or worker safety.

Use of food grade mineral oil as an additive for environmental dust suppression tends to be a self-regulating practice. The cost of applying the oil is about three-tenths of a cent per bushel when applied at the rate of 1.5 gallons per thousand bushels of corn, so there is an ever-present economic incentive to avoid over-application.

And it does not introduce risks of quality deterioration. It does not promote mold growth or insect infestations. Because it adheres to the kernel, it will not condense or collect in excessive quantities. Where a user does not wish to have oil added, he can so specify in the contract.

The essential points about use of additives to suppress grain dust are these:

- The practice is not an integral part of a sound program for minimizing risks of grain dust fires and explosions; these are better addressed by efforts to control ignition sources and dust concentrations within confined spaces;
- Additives can be useful to reduce fugitive dust emissions to the environment, but these benefits can be captured better through use of food grade mineral oil than water-add; and
- The benefits of water-add are small relative to the quality risks it introduces.

Incentives to Undermine the Integrity of the System

We believe there is no compelling argument for adding water to grain, even in small or controlled quantities, to capture either elevator safety or environmental protection benefits. A sound program of design, operation, maintenance and education to avoid safety hazards is much preferable to reliance on water-add. Similarly, use of food grade mineral oil to capture the environmental benefits of suppressed

fugitive dust emissions is preferable to water-add. And these preferences become even clearer when the risks to grain quality from water-add are included in the equation.

Beyond these simple, straightforward and fact-based problems with adding water to grain is a subtle but pervasive effect such a practice would have on the U.S. grain system overall. Sanctioning water-add would compel handlers at every stage in the grain handling system from inside the farm gate through end user to add water in order to remain on an even footing.

The problem is simply this. Addition of water **temporarily adds weight** to grain at no real cost to the applicator. Even at the level of 0.3 percent for corn (which was less effective as a dust suppressant than one-tenth that amount of food grade mineral oil), the effect at today's prices is to create three-fourths of a penny per bushel of added value. On the 6 billion bushels of corn that move off farms each year, that is potentially $45 million of additional value. The added value on soybeans today would exceed 2 cents per bushel, or $40 million for the typical crop.

This additional value is ephemeral in two important respects. First, it is charging grain prices for water. Second, because water tends to evaporate, collect or condense, the additional value has to be recreated at successive handling points in order to recapture the gain.

As a result, adding water to grain puts every grain buyer at risk of paying for something he didn't receive. To avoid incurring that loss, he must add water again to recapture the benefit. The inevitable consequence will be to force the entire grain industry to add water to grain to avoid being placed at an unfair competitive disadvantage.

The effect of virtually forcing water to be added to grain across the entire handling system would be undesirable. Grain is handled as much as four or five times as it moves from the farm field, to the truck, to the country elevator, to terminals and eventually to end users, processors or exporters. Each participant could be adding water, some perhaps on both inbound and outbound handlings. Some of the water could be soaked up by the grain. Some of the water could collect, condense or evaporate between handlings. It would depend on the grain's condition, the circumstances of how and where the water was applied and extenuating conditions. This much is clear, however. Repeated water additions would result in a cumulative wetting process that would have substantial and uneven effects on the quality of grain moving to market.

The cumulative effects and the uneven incidence of those effects would make it more difficult to maintain grain in good condition and to assure customers of uniform practices. The resulting uncertainties and increased handling risks would not be good for America's reputation for quality and integrity. Instead, customers would pay for grain weight they do not receive and have to accept quality risks that could be both large and unpredictable.

None of these consequences involve intentional abuse—that is, adding water just for weight gain. Because there are incentives to add water for weight gain and because it is nearly impossible to detect water-add, this risk of abuse would also be cause for grave concern.

Proponents of adding water to grain have suggested either that the practice can be regulated or that settlement terms could be altered to remove the incentive to add water to gain weight. There are two major problems with these arguments.

The first is that the proposals are impractical. Regulating the addition of water on the farm would be impossible. For many country elevators it would be unrealistic; well over half the country elevators do not have outbound scales by which grain could be weighed before water-add.

Settling contracts by excluding all consideration of moisture in grain—both moisture naturally occurring and that added—introduces new quality problems, including risks of cracking or breakage from overdrying. Paying on the basis of dry matter in order to permit water-add also does not address the increased risk of mold growth and insect infestations that water-add creates.

The second problem is that such arguments only address the risks arising from abusive water-add. But, there are risks to grain quality from the repetitive addition of water to grain under controlled circumstances. There also are risks to elevator safety—relying excessively on techniques to water down dust diverts attention from the design, operation and housekeeping measures that are more effective in preventing problems.

Very simply, what might be a reasonable practice on a limited basis under controlled circumstances is not a reasonable practice when done repetitively under a variety of conditions, some of which inherently cannot be controlled. Since sanction-

ing the addition of water to grain will lead to the latter circumstance, it poses unacceptable and unmanageable risks.

If adding water to grain were sanctioned, Cargill would first try to exclude it contractually by those seeking to do business with us. At the very least, this would be divisive and disruptive. Realistically, it also is unlikely to be effective, as sellers could only warrant their own practice and not what may have occurred at earlier stages. And there is no reliable way to detect if water has been added.

So, permitting water-add on a regulated basis would be tantamount to compelling the industry to engage in a practice with uncertain benefits but substantial risks for grain quality and storability. A secondary consequence could be to lessen reliance on preferred elevator design, maintenance and operating procedures to create a safe, clean work site in favor of a less costly but less effective technique.

Mr. BOTOS. Cargill advocates banning the addition of water to grain. We have backed our words with action. We require sellers to warrant, in writing, that they have not added water to grain sold to us and we warrant to buyers that we have not added water to the grain we handle. But this is not a practice that realistically can be disciplined contractually.

To deal effectively with this issue, Federal policy must be clear and it must be easily and efficiently enforced. It must treat all parties equally under the rules. Adding water to grain is detrimental to grain quality and storability. This problem was noted in the 1982 USDA study that looked at additives to suppress grain dust. That study reported that added water tended to collect in the dust portion of the grain stream. This concentration of the added water creates the conditions that promote mold growth and insect infestation, which limit grain storability and create unnecessary quality risks.

Permitting but regulating water-add will lead toward repetitive applications of water to the grain stream, because it both reduces handling costs and potentially increases revenues. Customers we buy from and sell to repeatedly express their concerns that problems from water-add will tend to accumulate as grain and grain-based products move into final use. We believe that the comments to be filed in response to the proposed FGIS service rule will clearly underline these concerns.

Proponents of water-add claim its safety benefits outweigh its quality risks. We disagree. Sound facility safety management is built around prevention, not partial fixes. Prevention means careful layout in design of plant and equipment and this can include moderating the speed of the equipment, enclosing equipment, utilizing controlled venting, pressurizing equipment rooms and motor control centers, avoiding long free falls, and sharp angles and steep inclines in the grain handling process. Design and layout should be supplemented with aspiration and air cleaning equipment at critical points. Proper preventive maintenance and housekeeping practices, and the installation of heat sensing and motion detecting equipment will also assist.

In other words, prevent problems from occurring. Water add is not a substitute for these other measures and it is at the bottom of any sound safety checklist.

Use of liquid additives has a value in reducing fugitive dust emissions to the surrounding environment, but food grade mineral oil is more effective than water-add in its initial application. It does not require repetitive applications. It does not create grain quality risk, and it is self-regulating. These benefits are largely environmental

and should not be confused with the essentials of safe elevator management.

We also believe that the Federal Government cannot regulate the addition of water to grain. It must ban it. There is no practical way to detect water-add or to provide buyers with assurances of how much water was added in the course of the grain's movement from the farm to the consumer, when the addition of the water occurred, or whether it was added in a uniform manner.

The fact is that no inspection system can do this for the entire U.S. grain handling system, including on-farm handling. It is neither physically possible nor economically sensible for the FGIS to do this when it is having to rationalize each dollar that it spends.

If the United States chooses to permit any addition of water to grain, additional water at least up to that level will become the standard throughout the U.S. system. If it becomes permissible for one, competitive pressures will make it incumbent on all. America's reputation for grain quality and integrity as a supplier will be called into question.

We agree with the Federal Grain Inspection Service when they say they cannot regulate the practice of adding water today. We also believe that they cannot regulate it under other conditions, such as in systems where the water weight is deducted from grain weight. Indeed, those systems create other problems for maintaining and ensuring grain quality, but it's not necessary to get to that question.

Adding water to grain is potentially harmful to quality. It is vulnerable to abuse. It offers no assurances on safety that are not available through other means. It's an environmental benefit only marginal and attainable in other, better ways, and since any program that attempts to oversee the addition of water to grain will end up compelling it, the better course is to ban the practice.

This is what the Federal Grain Inspection Service has proposed to do. We believe they will do it, and they should be given the opportunity to do so.

Thank you.

Senator DASCHLE. Thank you, Mr. Botos, for your statement.

Mr. Lucas.

STATEMENT OF J. STEPHEN LUCAS, PRESIDENT OF LOGISTICS AND OPERATIONS, LOUIS DREYFUS CORPORATION, WILTON, CT

Mr. LUCAS. Thank you, Mr. Chairman.

I want to thank you for inviting me to speak today on this topic, and in the interests of time, I would like to ask that my written remarks be entered into the record and I will supplement them with a few brief remarks here that may sound somewhat like we are all singing from the same page in the hymnal.

Senator DASCHLE. Without objection. Let me just say on that point, we have made quite an effort to get alternative points of view. We invited Peavey and they chose not to testify. We have indicated to others that they would be welcome to submit statements for the record and in some cases they have elected to do so. So we will have as balanced a record as we have the ability to create, but

it was certainly not design that has led us to the order that we have presented our witnesses today.

Thank you.

Mr. LUCAS. Mr. Chairman, I am Steve Lucas. I am Vice President of Logistics and Operations for Louis Dreyfus Corporation. I also serve as chairman of the National Grain and Feed Association's Waterborne Commerce Committee and I am a member of the Inland Waterway Users' Board, which is a Federal advisory commission dealing with navigation projects and their priority and their funding.

Louis Dreyfus Corporation is a major merchandiser of grains, oil seeds, and rice, not only in the United States but throughout the world. We operate 4 of the 63 terminals that were referred to in North America. We have 46 interior facilities and 2 rice mills. Those are scattered across 14 States and 1 Canadian province.

Now, I am appearing here today, it seems in conjunction with my friends in the industry, to advocate the banning of the practice of adding water to grain. At each of our facilities, for all of the reasons that have been stated before, we have a dust control strategy in place, and those strategies may differ from elevator to elevator, from filtration systems to enclosed drag conveyors, mineral oil applications, pit aspiration systems, either singly or together in some combination, depending on the facility. But at no facility, absolutely no facility, do we use water as a method of dust control. And in fact, we were the first company to attempt to buy grain from sellers certifying that they did not add water, at least at that point in the marketing chain.

Now, the testimony you have heard today all has said that water is an effective method of dust control, and that is a common-sense idea. Anybody who has ever been to a major league baseball game about 30 minutes early and watched them spray down the infield knows that water controls dust. There's no question about that.

However, in the grain industry, as we have heard, it is not the only method nor is it the most cost-effective method nor is it the most technologically effective method of controlling dust and preventing explosions.

But then the question is, why should we ban this simple, low-cost method? And there are three basic reasons.

Number one, adding water to grain allows the unscrupulous operator to add weight to the grain without adding value. As an example, adding a mere half a percent of water weight to a typical 50,000 ton shipment of soybeans, say to Taiwan, adds $50,000 in water weight, quote, "value." Now, that is $50,000 that the customer paid for that he did not get, and that same $50,000 goes to the operating revenues of that facility operator.

Now, I and my company believe that that is sufficient reason and incentive to ban the practice in and of itself.

Second, as we have heard, adding water has the potential to degrade the quality of the grain. That is important to the foreign customer because he is receiving goods, especially to the Far East, where they may have made a 30-day voyage enclosed in the hold of a ship through subtropical climates. The more water you add to that—I mean, I have a degree in microbiology, but you don't need

one to know that dark, heat, and moisture, what do you get? You get mold growth, and that's important to that customer.

Also, adding water, if it is not banned, as has been stated before, perpetuates that practice at every point in the grain handling chain beginning with the producer and going straight to the export elevator. The more water you add, the more chance you have, the more risk you have, of quality deterioration.

Thirdly, this practice ought to be banned because it is impossible to enforce any type of regulation. As I think Mr. Galliart said, there are approximately 10,000 elevators in this country today. To enforce some type of regulation of adding water to grain, you would need a full-time man, 24 hours a day, 7 days a week, 52 weeks a year, at each of those facilities. At least one man. In some facilities, you may need more. And I do not believe that FGIS has the manpower nor the facilities to do that, and I am not sure that the Congress would go along with authorizing the addition of that much manpower.

It is too easy to add water to grain surreptitiously. It's too hard to catch to regulate. So, therefore, we believe that this practice ought to be banned.

Now, normally, grain quality issues in this industry we have dealt with through the regulatory system with FGIS, and that system has worked well for a number of years on a myriad of issues. But we believe that this is a different issue. This is not primarily a grain quality issue. This is an issue of misrepresentation of weight, and that puts it in a different category from many of the other things that we have talked about over the years through the FGIS regulatory system.

Legislative action on this issue sends two needed and two very strong signals. Number one, it says to the grain handlers and the producers in the United States that the weighing and the marketing of grain in this country is to be conducted in a fair and equitable manner for all, so that no one has an unfair competitive advantage.

Secondly, it sends an equally strong message to the foreign buyers that the United States is committed to the highest standards of weighing and inspection, and we're sending that foreign buyer, whether it's the Chinese, the Russians, wherever in the world, the message that when they buy from the United States, they get a true weight and they get an accurate scientific description of the quality of the goods that they bought. And I think it is very important in today's marketplace that the U.S. preserve and protect that image in the world.

Thank you, Mr. Chairman. I would be happy to answer any questions you might have.

[The prepared statement of Mr. Lucas follows:]

PREPARED STATEMENT OF STEPHEN LUCAS, PRESIDENT OF LOGISTICS AND OPERATIONS, LOUIS DREYFUS CORPORATION, WILTON, CT

Mr. Chairman and members of the subcommittee: I want to express my thanks for inviting me to testify today on an issue of vital importance to the integrity of the U.S. grain marketing system—the question of adding water to grain as a means of dust suppression.

I am Steve Lucas, Vice President of Logistics and Operations for Louis Dreyfus Corporation of Wilton, Connecticut. I also serve as Chairman of the Waterborne

Commerce Committee of the National Grain and Feed Association and am a member of the Inland Waterway Users Board, a Federal advisory committee which is charged with recommending priorities of navigation projects to the President and the Congress.

Louis Dreyfus Corporation is a major merchandiser and exporter of U.S. grain, oilseeds and rice. LDC owns or operates 4 export terminals, 46 interior facilities and 2 rice mills with a total of almost 80 million bushels of storage capacity. These facilities are located in 14 States and 1 Canadian province.

I am appearing before you today to urge that the practice of adding water to grain as a means of dust control be totally prohibited. Dust suppression and control is a topic of vital interest to all participants in the U.S. grain handling industry for three reasons.

First, the U.S. grain industry has a tragic history of elevator fires and explosions. In the late seventies, we saw several elevator explosions which claimed tens of lives and caused millions of dollars of property damage. The research generated by these tragedies has conclusively shown that grain dust accumulation inside the elevator is one of the primary factors in potential explosions and fires. For this reason alone, we must have effective and reliable dust control systems in all grain handling facilities.

Second, aside from removing the danger of fire or explosion, dust control is essential in providing a clean and healthy workplace for all employees. Although there is no scientific evidence that exposure to grain dust poses any health hazards to elevator workers, it is only common sense and good business to provide the cleanest possible workplace for all employees.

Third, control of dust emissions to the outside air is the responsibility of all of us in the grain handling industry. It is our duty to preserve and protect the environment for all citizens of the localities where grain handling and processing facilities are located.

For all of these reasons, at each LDC facility there is a dust control strategy in place. Many types of technologies are used. Filtering systems, enclosed drag conveyors, mineral oil application and pit aspiration are just a few of the systems which we use, either singly or in combination according to the layout and usage of each facility. However, at no LDC owned or operated facility is the addition of water used as a method of dust control.

There is no question that the addition of a spray of water is an effective method of suppressing dust. Anyone who has ever watched the grounds crew prior to the beginning of a major league baseball game can testify to the effectiveness of water in suppressing dust on the base paths. This same principle also works inside a grain handling facility. Thus, the addition of water is used by some firms as a dust suppressant because of its low cost of operation and the relatively simple engineering required to install a water spray system.

However, the addition of water is not the only means available to an elevator operator to control dust. There are many other technologies used today by elevator operators which do not involve the addition of water to the grain. Many of these alternatives are summarized in Chapter 11 of *Retrofitting and Constructing Grain Elevators,* a publication of the National Grain and Feed Association. It is interesting to note that firms using these alternative methods are able to compete effectively in the U.S. and world grain marketplaces.

Why, then, should this low-cost, simple dust control system be prohibited? First, the addition of water under the guise of dust control allows the inattentive or unscrupulous elevator operator to add weight to the commodity being handled. This addition of weight in the form of water skews the marketplace in favor of those few unscrupulous operators. As an example, the addition of a mere one-half of 1 percent of water weight to a a typical 50,000 metric ton vessel of soybeans represents almost $50,000 of value added to the cargo. Thus, the foreign customer is paying for $50,000 worth of soybeans which he will never receive. Instead, that same $50,000 goes directly to the operating revenues of the loading facility. This powerful economic incentive alone is reason enough to prohibit this practice.

Second, addition of water may adversely affect the quality of the commodity, especially as it is stored for long periods of time on inland river barges or onboard an oceangoing vessel destined for the foreign customer. This deterioration in quality obviously leads to a decrease in the value of the commodity and may also lead to an increase in complaints about the quality of U.S. grain from foreign buyers. Thus, in order to maintain the integrity of U.S. grain quality it is imperative that this practice be prohibited.

Third, adding water to grain should be banned because regulating this practice would be impossible to enforce. There are approximately 10,000 grain handling faci-

lites in the United States. To enforce any type of regulation would require a minimum of 1 inspector at each of these 10,000 facilities every time the facility was in operation. However, even this vast expenditure of resources and manpower would not be enough to prevent the surreptitious addition of water when an inspector was not present.

Issues pertaining to grain quality ordinarily do not need legislative action. Through the Federal Grain Inspection Service regulations, we have a system that can deal rapidly and effectively with most issues relating to grain quality, inspection and weighing procedures. These regulations and the practices which have grown up around them have found acceptance in the marketplaces of the United States and the world as being fair and equitable to both buyer and seller.

However, because of the high possibility of abuse and the difficulty of enforcement, the issue of adding water to grain is one which may require legislative action. A legislative ban of this pernicious practice would send a strong message to domestic elevator operators that the weighing and marketing of grain in the United States is to be conducted in such a manner that there is no possibility of unfair advantage for any firm.

Also, a legislative prohibition of this practice would send an equally strong message to foreign buyers that the United States is committed to maintaining the highest standards of weight and quality inspection in the world. It would let these customers, so vital to our balance of payments, know that the U.S. Congress will not allow them to be cheated by unscrupulous or inefficient grain handlers. This message, in and of itself, would raise the standing of the U.S. system in comparison with our competitors around the world.

Finally, any legislative ban of this practice should also have sufficiently strong penalties attached so as to deter anyone considering adding water to grain. To do otherwise would only encourage the addition of water at all levels of the grain handling system from the farmer on down to the export elevator.

Thank you again Mr. Chairman for your time and attention. I would be glad to respond to any questions.

Senator DASCHLE. Thank you, Mr. Lucas. That was just an excellent statement. I do not know how anybody could put it any better than you just have, and I really commend you for the quality and the persuasiveness of your argument.

Mr. LUCAS. Thank you.

Senator DASCHLE. Mr. Wilson.

STATEMENT OF WINSTON WILSON, PRESIDENT, U.S. WHEAT ASSOCIATES, INC.

Mr. WILSON. Thank you, Mr. Chairman, Senator Kerrey, Senator Craig.

In regard to Mr. Lucas' remarks of everyone singing from the same songbook, I suppose I have an additional verse, maybe because I am looking only from the more narrow focus of the wheat industry.

Senator DASCHLE. It is balance we are looking for.

Mr. WILSON. Yes. Well, maybe not quite as much as some people would like to see.

I am Winston Wilson, President of U.S. Wheat Associates, which is the foreign market development organization funded by U.S. wheat farmers and the U.S. Department of Agriculture. I want to commend you for holding this hearing. I think it is very timely, but I do not know that from our point of view, the answers are quite as easy and clearcut as previous discussion would indicate.

I want to make it clear from the outset that wheat farmers, at least those who are in our organization and other responsible producers, are outraged by these abuses, some of which were described by Mr. Stang, and other instances that we have read about in the press and in some cases know about firsthand. We can't blame all

of this on the grain trade. It is happening in some cases, unfortunately, at the farm level, too. And it certainly needs to stop.

As a consequence, it would be very easy to support a complete ban on adding water and end it there. But we have one major concern which has really not been discussed fully but was touched on by a couple of the previous witnesses, and that is, we have a lot of difficulty supporting the total ban on adding water for dust suppression purposes if the only alternative is the use of vegetable or mineral oil.

It is a matter of grave concern to us. We find that in the United States there are quite a few flour mills which specify in their orders that they will not accept grain that has been treated with oil. Some of these mills are even part of the large grain handling companies. This is not yet a problem overseas. We think, though, it is something that is being looked at.

We would like to see a little more research done on what the impact is. We are fairly certain that wheat that has been treated with vegetable or mineral oil is adversely impacted, particularly for whole wheat products and also for some baked goods, particularly pastries. Consequently, we are very concerned if suddenly all of the wheat that is being exported or a large portion used domestically is treated with either vegetable or mineral oil as a matter of course for dust suppression.

We think there are some impacts here that are not fully understood. We think they need to be looked at. As a consequence, we feel that perhaps we need to take a stronger look at the concept of allowing water being added for dust suppression, but make sure that it's done in very regulated fashion, which is not easy. But I think it is something we need to look at.

The alternative, which was discussed briefly by one of the witnesses, is to improve the mechanical removal of dust, this is very expensive and frankly is not always as effective as it really needs to be because there is a very real danger of dust explosion in any facility that is moving grain.

In terms of arriving at a system of regulation, one system that I think would be very controversial but would be very effective is to give a very serious look at the concept of marketing grain on a fixed moisture basis. It is complicated, it is a sea change in the industry, but it does have some very definite advantages, as we can see.

One, it totally removes any economic incentive to add excess moisture at any level in the chain. Secondly, we think it would be a very decided advantage in the overseas export markets. Nobody else in the world markets grain on a fixed moisture basis. The United States has a very distinct advantage over many other exporters, because, as a general rule, with one or two exceptions, our grain that is exported is much drier than that of most of the competition.

By developing a system of marketing based on a fixed-moisture basis, we would propose 12-percent rather than a 0-percent basis, because this would be less of a dramatic shift in tonnage and bushels, it would give us a leg up. It would be something unusual and different.

I know, Mr. Chairman, you mentioned this in your opening remarks and I think it is something that bears serious consideration. It certainly would take care of the problem of unscrupulous addition of water to wheat or any other grain. As I said in the beginning, I think we are certainly not pleased with some of the things that have been occurring in the grain industry in terms of additions of water.

At the same time, because we feel that there is a very serious lack of understanding of the impact of adding oil, either vegetable or mineral, to wheat, the impact it has on the milling process, the baking process, that we would not like to see a sudden shift where a large percentage of the wheat is being treated with oil. There's been, as far as we can determine, no definitive work done on this and we would like to see some of that done before oil becomes the only economical dust suppression system.

That concludes my informal statement. We do have a longer statement which we'd like to submit for the record.

Senator DASCHLE. Without objection, that will be made part of the record.

[The prepared statement of Mr. Wilson follows:]

PREPARED STATEMENT OF WINSTON WILSON, PRESIDENT OF U.S. WHEAT ASSOCIATES, INCORPORATED

Mr. Chairman and members of the subcommittee, not only is this a very timely hearing that you are holding today, but it also deals with an issue which seems to have no clear-cut and totally satisfactory resolution.

U.S. Wheat Associates is very concerned about reports of excessive amounts of water being added to grain to increase weight. However, in the case of wheat, banning all uses of water—prohibiting even legitimate dust suppression uses—is not a completely desirable solution. Dealing with this issue through regulation rather than legislation would provide greater opportunity to examine the unique issues of water versus oil for dust suppression affecting wheat.

While relatively few facts uncovered by Government investigators have been published, U.S. Wheat shares the concerns of others in the industry that excessive or abusive addition of water to grain by some may be affecting grain quality and forcing competing grain handlers to respond by adding water as well. One of the major advantages that U.S. wheat enjoys compared to competing exporting countries, particularly Canada and France, is the relatively low moisture content of U.S. wheat. For the flour miller this translates into more flour produced (and more money earned) per ton of wheat purchased. Adding water to wheat to increase its weight erodes this advantage. Simultaneously it creates the risk of adding undesirable bacteria or other materials to the grain and may create an environment for mold growth or other damage to occur. Many countries are developing an increasing awareness of food safety issues and are much more sensitive to the hazards presented by adding water to wheat than they may have been just a few years ago.

Despite these concerns about water, simply banning all use of water may create more serious consequences for the wheat industry than the ban is intended to resolve. There is a legitimate use of water for dust suppression purposes, which was well-documented by research in the 1980's. While using water to suppress dust is not nearly as desirable as removing the dust using aspiration or other cleaning processes, water as a dust suppressant is much more desirable than either mineral or vegetable oil. Water at least is a naturally occurring substance in wheat. The amount of water required to suppress dust is quite small and does not need to cause any quality deterioration.

Oil on the other hand does not naturally occur in wheat. Oil has adverse effects on flour yield and color, both important factors in determining the profitability of the milling operation. Oil can also cause bacteria and other undesirable materials to adhere to the wheat kernel, particularly in the crease of the kernel, and therefore reportedly can raise bacteria counts in flour. Because some of the oil is detectable in the resulting flour, it may have adverse effects on the quality of the end product. Also, many products are now made from whole grain, which include all the oil

sprayed onto the wheat. As a result, some of the largest U.S. baking companies refuse flour from wheat treated with oil.

The issues of water and oil are closely related because there are only three methods of controlling grain dust: either water or oil can be used to suppress dust or aspiration (cleaning) can be used to remove dust. Cleaning and aspiration have very desirable effects on quality, but are said to be more expensive. Both water and oil can degrade quality, but the effects of oil on wheat as discussed above are worse than properly used water. If water is removed as a possible method, that will leave only oil and aspiration. U.S. Wheat is concerned that elimination of water as an option for dust suppression will result in more widespread use of oil with a resulting increase in multiple oil applications and deterioration in the quality reputation of wheats exported from the U.S. While most U.S. processors are reluctant to step forward to defend the use of water, they do not like to see either oil or water added to wheat. U.S. mills can avoid purchasing wheat treated with oil if they wish. This is impossible for importers who have little or no control over what happens to the wheat other than at the export point.

There are other possible methods to control the abusive use of water, short of banning its use entirely. One idea is the establishment of a permit system for water dust suppression systems. Cost of issuing permits and monitoring water usage could be covered through fees. Abuses could be controlled by using meters to record the amount of water used and comparing that with the volume of grain handled. Elevators are currently audited, and water usage could become a part of that audit process. Some, however, argue that a permit system would be expensive to implement and maintain. As it would not actually eliminate the incentive for adding water, there would still be reasons to circumvent the controls or find ways to add the maximum amount of water allowed by the system.

Another possibility, which U.S. Wheat would like to see explored further, is changing the basis on which the weight of wheat is reported. Currently no weight adjustment is made for the moisture content of the grain. However, millers are interested in how much dry matter they are purchasing. This information could be provided by trading wheat on a "dry matter" or "fixed moisture" basis. The advantage of fixed moisture weights over dry matter weights is that the weights reported would not need to be so dramatically different from those reported currently. Reporting weights in either of these ways would provide more meaningful information to millers and more accurately reflect the value of the grain. It would also eliminate the economic incentive to add moisture to increase weight as the fixed moisture weight would not change as the result of adding water.

FGIS successfully implemented a change from reporting protein on an "as is" moisture basis to a fixed 12-percent moisture basis in 1987. The advantages of the change were similar to the likely advantages of changing the way weights are reported, namely that fixed moisture protein is more meaningful to processors. Fixed moisture protein reporting quickly became the industry standard in the U.S. and was readily understood by most foreign buyers. Conceptually the change to fixed moisture weights is very similar and likely could be implemented by changes in the way FGIS reports weights at export points.

While there are methods of controlling water use that have not been fully explored, there also is no guarantee that banning the use of water would be fully successful in stopping abuses. FDA already bans the use of water for the purpose of increasing weight. While facilities where FGIS personnel are routinely present would be unlikely to ignore a ban, others may still respond to the incentive provided by the existing system to gain from adding water. Some growers reportedly engage in the practice of adding water to wheat, and a ban may not affect their actions.

U.S. Wheat believes that abusive adding of water to grain is a serious concern. However, questions remain about the effect on wheat quality of encouraging greater use of oil as a dust suppressant. Also, there are possible alternatives to a ban that have not been fully explored which could retain this important dust control method while discouraging abuses. Issues such as these can more effectively be addressed through the USDA regulatory process than through legislation.

This concludes my statement. I would be happy to attempt to answer any questions that you might have.

Senator DASCHLE. I ask at this point that a number of letters we have received from a range of different people interested in this issue be made part of the record.

[The letters appear in the Appendix.]

Senator DASCHLE. Since you have ended your statement, I want to call on Senator Craig for his questions, but I think it would be helpful just for a clarification of the issue you just raised on milling. Dreyfus and Cargill obviously deal with millers. What about this? Do millers reflect their concern to you about oil applications, and how do you handle that?

Mr. BOTOS. For Cargill, some do and some don't. It is taken care of contractually. Those that prefer us not to apply an additive oil to the wheat that we ship them, we do not do it. It is handled in the contract.

I would like to add that Mr. Stang's statistics were that 63 export elevators are operating and 16 of them use some sort of an additive. I believe that was the number that you quoted. It's something like on the order of 25 percent or less than 25 percent of the elevators are using any type of additive, and that pretty well correlates with our own internal statistics. So additives are not a big part of the equation here. The discussion should be on banning the addition of water.

Senator DASCHLE. Mr. Lucas.

Mr. LUCAS. I would second that, that our experience has been that yes, there are some millers who will only buy wheat that has not been treated with mineral or vegetable oil. We deal with it in the contract, we source that grain from the appropriate place. That has not been a problem from us, and I do not believe that is going to be a problem in the future.

Senator DASCHLE. Mr. Galliart, do you have anything to add to that? Or any of you?

Mr. GALLIART. Only that I agree. We have not received all that many complaints about oil added to grain.

As I mentioned earlier in my testimony, we have looked at the possibility. It's just that as the gentleman indicated, it is most difficult to find a way to allow adding water to grain in any capacity.

Senator DASCHLE. Thank you. Senator Craig.

Senator CRAIG. Mr. Chairman, thank you very much. Thank you for putting this hearing together. Obviously, by the testimony and by the general information that's been made available to us, this is an issue of some concern and should be dealt with.

I apologize, Dr. Steele. I came in during your testimony, so let me ask you a question that you might have answered in your testimony. Concern was just expressed by Mr. Wilson, president of U.S. Wheat, as it relates to lack of information or knowledge regarding the full impact of the use of oil as an additive. You were commenting on that as I came in. Can you give us any information you may have as it relates to that application? Is there concern about alteration in grains by millers?

Dr. STEELE. I believe the only information that I know of is comments that we have received from millers of wheat and then there is an article, written by I believe Robert Reid, that suggests some loss in milling yield and color, and some suggestion that maybe some contaminants get carried over into the flour. Those contaminants might be insect fragments or mold spores, things like that. There is probably limited research data on that.

Senator CRAIG. Oil is an adhesive, in this instance, I guess, or a dampener or a controlling agent. In the long term because of its

lack of ability to dissipate, does it tend to attract? Is it more adhesive, if you will, to the grain itself than water? Is that what you're saying?

Dr. STEELE. It stays on the grain or is absorbed in the surface of the grain, whereas water potentially could evaporate or absorb throughout the kernel, and yes, that's basically what happens.

It should be pointed out, I think, that generally, aspiration or pneumatics are not thought to take away the respirable dust and portions of what we call the fine dust category. The oils tend to bond those particles to the kernel and they stay there and some get processed through into the flour.

Senator CRAIG. I understand by the testimony of both Dreyfus and Cargill that you at this time use no water in any of your operations?

Mr. BOTOS. That's correct.

Mr. LUCAS. That's correct.

Senator CRAIG. For anyone here, is it possible to—and this shows clearly my ignorance in the application of water or oil—is it possible to overdo the use of oil as it relates to the application versus water, as we know can and does get overapplied?

Mr. LUCAS. Senator, if I might?

Senator CRAIG. Yes.

Mr. LUCAS. It is possible to overdo the application of oil, but just as there is an economic incentive to overdo the application of water, there is an economic disincentive to overdo the application of oil.

Senator CRAIG. In the use of oil, what results if that were to happen? I am talking about both the mechanical handling of it, the characteristics of the wheat involved, and do you, in fact, in proportion, add additional weight to offset the disadvantage?

Mr. LUCAS. I will defer to Dr. Steele on that as being much more practiced.

Dr. STEELE. The overaddition of oil is what we generally think of as the millers' problem. If it is at 200 parts per million, we do not think they would have the trouble that they report, generally.

It's the repeated application of oil, because the perception is that if I'm going to treat with oil, I will treat everything that goes through with oil, whether it has been treated before or not. Part of that equation is that we don't have the practical economic tools that would readily detect a prior application of oil and enable us to avoid duplicate applications.

Mr. BOTOS. Mr. Chairman, if I may?

Senator DASCHLE. Yes.

Mr. BOTOS. I have a copy of a study that was conducted in 1982 by the USDA and it answers some of these questions that you're asking, and I would submit this for the record. There are two points that I would like to make about this study.

One, it makes the statement that laboratory analysis of the treated wheat revealed no adverse effect on milling or baking quality of the flour caused by the application of oil. That's one of the conclusion statements in the study.

There is another set of statements here that says the total weight of dust collected from grain treated with water was greater than the weight of the dust collected without an additive, inferring

that the substantial amount of water was probably in the dust, which goes to the point of water add collecting in the dust and causing grain quality problems. Some of the other questions about residual effects are included in this study.

So if I may, I would like to submit this.

Senator DASCHLE. Without objection, we'll make that part of the record. [2] Thank you.

Senator CRAIG. Mr. Chairman, another question, and this to Mr. Wilson, as it relates to your suggestion or concern about the elimination of water as an application. The absence of certain knowledge could create some problems, and you suggested a reduction in the percentage of moisture? Is that what I understood you to say?

Mr. WILSON. Well, we think it ought to be strictly regulated and absolute maximum allowables should be well below the .2 range. But what we really think ultimately could solve this problem is to remove the incentive to add water for economic reasons, which is look at the weight basis in which you market wheat, and if you do that on a fixed moisture basis, that problem takes care of itself, because there's no incentive to add 1 gallon more water than you need for dust suppression. In fact, there is a disincentive to do so.

That is not something that you can get done overnight or in 6 months, but it is an area that we feel needs more exploration and a serious look taken, because it does have some distinct advantages to the United States in export markets.

Senator CRAIG. In establishing a fixed moisture basis—I am not sure I understand the mechanics of that—I think I understand what it means, but let me ask this question. By setting a moisture ceiling that everybody tends to drive to, do you risk allowing someone to gain some advantage if their particular grain is less moist? Are you creating an advantage there? Are you creating an incentive to add water beyond dust suppression by the creation of a ceiling? A fixed moisture ceiling?

Mr. WILSON. Well, it could be a target if you set it at some level which is abnormally high or low. If you, say, go 12 percent, which is about average moisture for U.S. wheat, you're not going to—some people are going to fare better, others are not going to fare quite as well, and it could be a little incentive there. But there's not going to be much incentive, dangerous incentive, between 9 and 12, because there's not that much 9-percent wheat that's harvested naturally. So you could set that wherever you wanted it. You could set it at 11.5, if you wanted to.

Senator KERREY. I have trouble with this 12 percent, because Mr. Stang's charts show the moisture in outbound samples from water-added elevators in the range of 15 percent.

Mr. STANG. That is for corn, yes, sir.

Senator KERREY. What does it show for wheat? Do you have the chart for wheat in there?

Mr. STANG. No, sir, we did not perform an analysis on wheat shipments. Our investigation dealt with corn shipments in this particular case.

Senator KERREY. Never mind. [Laughter.]

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[2] See pp. 62–94. Tables and figures referred to in the text of the study are unavailable for reproduction.

Senator CRAIG. To pursue this a little further, I understand shrinkage and/or the loss of moisture over a period of storage time, and moisture content in/moisture content out. Assuming extended periods of storage, are we still creating a ceiling where we would drive to bring the moisture up? Is there a risk of that?

Mr. WILSON. Well, there is conceivable risk of that, but you could always drop it some. But the problem you get into any time you make a change of this significance, which is a major change, as I said earlier, it is more acceptable if the change is mitigated by not making it totally removed from reality.

For example, if you suddenly said, oh, this is a great idea, let's do it on a 0-percent moisture basis, you would have—I tell you honestly, I would certainly hate to have to explain to my father in Texas why his tonnage went down so drastically, and it's something that would be hard to sell.

But if you pick a level that is more or less average for the country, some people gain a little, some people lose a little. But you do not have this dramatic change in the weight they are being paid on.

Now, this is not some theory that we have all the details worked out, but it is something we have been looking at in terms of an answer to this problem of people adding moisture that they should not be, and secondly, because U.S. wheat is typically drier than any other exporter, with the exception of Australia, it would give us a decided advantage, we think, in the international marketing place.

But you could use 12, you could use 11, whatever.

Dr. STEELE. If I could add one other thing. I think under that type of a program, you remove the incentive to add weight by water or whatever and there are several ways, of course, to add weight by water, but what also happens, in regard to your question, is that now the safe storage moisture level becomes more important. In the industry, the originators of grain or people who are going to be buyers of grain are going to have to recognize and set that safe storage moisture level for the purpose for which they are going to use the grain, and that is the secondary sort of thing that might happen with buyers of grain saying we will discount or charge for having too much moisture above the safe storage moisture level.

Senator CRAIG. Mr. Chairman, one last question.

Mr. Galliart, if tomorrow you promulgated regulations to ban the use of water as a dust suppressant, how many people in the industry would it impact?

Mr. GALLIART. Well, I am not sure I can give you a specific figure on how many people it would impact.

Senator CRAIG. Well, we had a figure of 10,000 elevators.

Mr. GALLIART. Yes.

Senator CRAIG. How many of those elevators would be impacted?

Mr. GALLIART. I am not sure I can answer that question. Kay, do you have any idea?

Senator CRAIG. We do not know those figures?

Mr. GALLIART.We know that Mr. Stang and his associates from the Office of the Inspector General looked at about 30 elevators in the interior and those 30 elevators were using water.

Senator DASCHLE. You looked at 30 and all 30 were using water?

Mr. STANG. Yes, sir.

Senator DASCHLE. Did you select these 30 arbitrarily?

Mr. STANG. No, sir. [Laughter.]

Senator CRAIG. Well, then, let me pursue this question a little more. Is water now a common and acceptable and readily used device for dust suppression?

Mr. GALLIART. Well, I mentioned earlier, Senator Craig, that out of the 63 export houses in the United States, 3 use water.

Senator CRAIG. Well, but that's a—okay. Is 63 in this instance and the term export house versus the 10,000 elevators of the interior, not the core but the whole of the country, are they uniquely different? And for what reasons might they be, if they are?

Mr. GALLIART. I do not think they are uniquely different.

Senator CRAIG. They are still handling grain, they are still generating dust by the handling of that grain, they still ought to be concerned about quality?

Mr. GALLIART. Yes.

Senator CRAIG. Might these 63 exporting houses be more customer order oriented and, therefore, necessarily more quality control oriented? Could you respond to that?

Mr. BOTOS. Well, we operate a variety of elevators, as you know. We operate country elevators and we operate subterminals and we are processors and we are exporters.

Senator CRAIG. Yes.

Mr. BOTOS. So we are in the whole gamut of the export and the grain handling chain, and our customers that we buy from in the country, we ask them to tell us that they have not added water. We do not have a problem originating grain from customers that have not added water.

I think that the statistics, while he's not willing to say, if you have 3 export houses out of 63 using water, I think that same trend may be typical in the country. I think the vast majority of the industry does not use it, and I think the vast majority of the industry favors banning the addition of it.

Thank you.

Senator CRAIG. Thank you, Mr. Chairman.

Senator DASCHLE. Thank you, Senator Craig.

Let me just follow up on a couple of Senator Craig's questions, and then I will ask Senator Kerrey for whatever questions he has. I have a slew of them and I do not want him to have to wait for me to finish, but I would just like to follow up on the issue of marketing grain on a fixed moisture base. There are a lot of different terms for it. Dry matter marketing is another term that is used. But the concern I guess I have is that there has been no movement in the industry toward that, and I assume, Mr. Wilson, that you would not support a regulatory approach to dry matter marketing. You would not like to see it legislated. You would like to see the industry take this initiative in and of itself. Is that a correct interpretation of your position?

Mr. WILSON. Well, with all due respect to the U.S. Congress, both Houses, we find usually that these things are better handled by the industry meeting together and spending about 3 years getting something ironed out.

Senator DASCHLE. That is exactly the point, 3 years, and that is probably conservative.

Mr. WILSON. Well, it took about 2 and a half to make what we felt was a rather insignificant change in the way dockage is reported. But we did it, and it has been very useful.

Senator DASCHLE. Let me ask Cargill or Dreyfus, is there a movement within the industry to consider dry matter marketing, and if not, why not?

Mr. BOTOS. It is not necessary. We are in a worldwide industry. It is not used.

Senator DASCHLE. Would it put us at a disadvantage worldwide?

Mr. BOTOS. I think it would.

Mr. LUCAS. Not to be flippant, but we have trouble explaining the invoices to some of the customers the way we do it now. Trying to adjust to dry matter basis, I mean, that is a major change and a major education process all around the world, and I don't believe we can wait for that education process to take hold to solve the problem we came here to talk about, which is misrepresentation of weight.

Senator DASCHLE. How would you respond to that, Mr. Wilson?

Mr. WILSON. Well, I said myself, it's a major change, but I do not think just because it is a major change we should say, well, forget it, and never think about it. I think we need to pursue it, because it is a means of removing the advantage of adding water or anything else and I think it does give us a major advantage in world markets.

You know, just because it is different does not mean we cannot do it. We are the only country in the world that has dockage as a part of our grade factors. Well, why do not we eliminate that? You establish a system with grades and standards and selling practices that best fit the needs of the industry of our country, and so it's different. Every country has a little different marketing system.

But I would say that very rarely is there any—nowhere do I know of a product that's sold on a zero moisture basis or a fixed moisture basis. But it could be done. But it takes a lot of education.

Senator DASCHLE. But you can see our position. Here we are, faced with a situation where it appears the majority of the industry favors banning water. You have got major participants in the industry who have examined your suggestion and have said, "Look, this is going to put us at a very distinct disadvantage. We do not like it."

You're telling us you don't want to see it regulated or legislated. Where does that leave us?

Mr. WILSON. Well, as I said earlier, I do not think there's an easy solution. All things being equal, we would certainly be in favor of banning the use of water, but this problem with the oil is a serious concern to us, because there is really not a body of information on this except for some work done in 1982, but when you have a fairly large number of domestic millers who specify that they do not want wheat that has been treated with oil, that is something we should pay some attention to, because whether or not there is research or not, if there is a perception by the customer that this is undesirable, then you have got problems, unless you can change his mind.

Senator DASCHLE. I want to get into that in far greater detail, and I realize that some of our witnesses need to catch airplanes, but let me ask Senator Kerrey for his questions at this time.

Senator KERREY. Thank you, Mr. Chairman. I, as well, appreciate your holding this hearing, and I assume because of the difficulty of scheduling that this will just be an opportunity for us to express concerns, and there will be additional meetings and deliberations about what we should do.

I really have three areas of concern. One is, what is the problem here? What problem are we trying to solve? And number two, operating on Newton's Second Law, what problems are we going to create with this ban?

Ever since I discovered Moses' top ten list, I have been very wary about "shall nots," and we are proposing a Federal ban here. So my question is, my second concern is, if we do impose a ban, what are the implications of that, and my third question is, is this a principle that we are willing to apply in other regulatory areas? In other words, the principle I hear is, yes, we know there are people out here using water correctly, but some people are using it incorrectly. The Government can't regulate those who are using it incorrectly, so we're going to ban everybody, because the Government cannot get out there in every case and separate the good guys from the bad guys.

Well, I can tell you, I take a dim view of that in many areas of my life. If you came to me and said, "I understand you're doing it right, Bob, but there are three or four other people who are not doing it right, and thus we have decided you cannot do it at all, because we cannot police you." Well, I would respond, "Who decided you had to police me in the first place?"

I am trying to ascertain, number one, what is the size of the problem, and it seems to me you are saying that you are not sure. You say there's 10,000 elevators and you are not sure exactly how many of them are using water, and you are not sure, of those who are using water, exactly how many of them are using it in an inappropriate fashion.

In other words, I heard in both discussions down at the other end of the table representation that I was going to have to put policemen out on every single one of 10,000 elevators—in fact, I would probably have to go on farm site if I was going to make the ban work. Do you understand what I am saying? Can we make a ban work? Is this the appropriate regulatory response for this particular problem?

Mr. GALLIART. Certainly, we cannot have an FGIS employee at each of the 10,000 grain elevators in the United States; there's no question about that.

Senator KERREY. And we don't for other problems where there is a relatively small——

Mr. GALLIART. The matter of banning water started some many months ago. Many, many comments from the industry asked FGIS to do something about banning water, because it's being misused. The comments indicated that if FGIS does not, then those who aren't using water will have to. Not only that, foreign customers complained about adding water to grain.

We in FGIS do not have a facility for monitoring the amount of water applied to grain. It may be that in the coming months some state-of-the-art method will be developed that will allow us to have a look at a procedure that would give us enough assurance that we——

Senator KERREY. But if I have a ban in place, sir, you are going to have to go out and make sure that ban is being adhered to, are you not? With a ban, you will need personnel to enforce the ban.

Mr. GALLIART. We will simply have a regulation or a law that prohibits it. There are, certainly, there are those who will continue to violate the law. Just like the traffic lights out here, people run through the traffic light.

Senator KERREY. We have policemen that we hire to do that. Are you going to go out and do the same, then?

Mr. GALLIART. No, but I will tell you what we will do.

Senator KERREY. Or we will have a ban that is not enforced.

Mr. GALLIART. Certainly there will be those who would use water with the ban and may well be able to get away with it.

Senator KERREY. So it does not solve the problem.

Mr. GALLIART. Certainly not. But anybody and everybody that handles grain in this country will know that it is against the law.

Senator KERREY. And they will also know it is not being enforced.

Mr. GALLIART. To the extent that we can——

Senator DASCHLE. Well, but is that not the case in just about every law we pass? We would not have any prisons, if we thought that there was going to be 100-percent compliance with every law we pass.

Senator KERREY. Well, one of the reasons that we have difficulty with law enforcement is people do not suspect they are going to get caught, and this is a situation where you are saying precisely that you're not going to be able to effectively enforce the ban. Is that right or wrong?

Mr. GALLIART. When you are dealing with 10,000 elevators in this country, it is going to be difficult for us to know what is going on in every elevator. No question. And there are those who will run a risk violating the law.

Senator KERREY. Have you sized the problem? We don't have a problem with 10,000 elevators, do we, today?

Mr. GALLIART. I do not think so.

Senator KERREY. We do not have 10,000 elevators using water. Do you know how many elevators are using water? Is it 1,000? Is it 3,000?

Mr. GALLIART. We have not made that survey.

Senator KERREY. Well, how do we know that—we cannot regulate water use under a high standard if we do not know how many are actually using it. How can you answer the question, you cannot get the job done if you do not know what the job is.

Mr. SHIPMAN. Senator, can I add a point? I think the concern that we have is, right now it is a small problem. We suspect——

Senator KERREY. How do you know it is a small problem?

Mr. SHIPMAN. It is our judgment that it is. We know exactly how many are using it on the export side.

Senator KERREY. It is a guess, correct?

Mr. SHIPMAN. It is a guess at how many are using it, but we are——

Senator KERREY. What is your guess?

Mr. SHIPMAN. That what we see in the export market, if it is 12 percent or something of that nature, that we would typically see similar percentages in the domestic market. We know there are elevators using it in the domestic market. The concern is, as soon as we set a level and we say it's okay to apply this level, we will have everybody doing it, and then we will——

Senator KERREY. Oh, no, no, we do not have everybody doing it now.

Mr. SHIPMAN. The indications are, the feedback that we have had, and this is why we're in the rulemaking process right now——

Senator KERREY. We have two very large and reputable companies down there saying they do not want to do it at all.

Mr. SHIPMAN. I took their testimony to mean that if we set a limit and everybody was doing it, they would do it.

Senator KERREY. Is that correct? It is allowed now, and they choose not to use it.

Mr. GALLIART. Well, there are those who have told us in the industry that this would force them to use water because it would be an unfair competitive——

Senator KERREY. If it was an unfair competitive advantage, sir, they would be doing it now. You do not use water today, do you?

Mr. LUCAS. We do not use water today.

Senator KERREY. Because you have decided that it is not the best control method?

Mr. LUCAS. We believe there are other methods that are equally effective, but I will tell you, it is a system that puts us at a competitive disadvantage to an elevator in the same locale that adds water.

Senator KERREY. Well, would you support a ban on using relatively high moisture corn to blend with relatively low moisture corn to achieve an acceptable level? Shall we ban that practice?

Mr. LUCAS. I think we already have somewhat of a ban on that. There are some limits on that, on the blend.

Senator KERREY. If we have a problem here where a ban is the correct regulatory response, I will support it. I do not object to that as a conclusion. But I think no one should underestimate what we're about to do. If we are about to ban something in the United States of America, and I must say I am very disturbed by the principle that says, as I indicated earlier, I have got to ban it because I cannot stop it. I have to ban it, even though I know there are people out there using it appropriately. I am telling you, that standard would not be something we'd want to apply to every other form of human behavior, including your area of business, I would suspect. I think we would not want to apply that in all other areas.

Mr. BOTOS. Let me try to quantify this for you. I believe the number is that three elevators in the export arena are using it. That is on the order of 5 percent of the export elevators.

Senator KERREY. Three?

Mr. BOTOS. Three of 63 is something like 5 percent.

Senator KERREY. Are using water?

Mr. BOTOS. Are using water. And I think those statistics probably are comparable for the Nation's grain handling structure.

Senator KERREY. And I suspect it is also true that if it is 3 out of 60, which is 1 out of 20, which is 5 percent, then I have 5 percent times 10,000, I have 500 elevators using water?

Mr. BOTOS. That conclusion could be drawn from those numbers.

Senator KERREY. Is it also possible that of the 500 elevators, 30 or 40 of them are running 80 percent of the grain or 90 percent of the grain, a large percentage?

Mr. BOTOS. No. Senator, I——

Senator KERREY. But it would be a smaller fraction. What I am trying to say is, is it not possible that we can cut this thing down to size and say that we are looking at not 10,000 elevators, but there are 30, 40, 50, a relatively small number of elevators compared to 10,000, certainly, that are potential abusers? It's not 10,000 elevators.

Mr. LUCAS. Senator, 2 years ago we were the first company to attempt to buy grain and have the sellers certify that they had not added water to it during the sellers' handling.

Senator KERREY. Yes.

Mr. LUCAS. In the first month or so of that, I would say that we had difficulty buying 50 percent of what we normally bought prior to instituting that policy. Now, that percentage has gone up today, but there are still people in this country from whom we cannot buy grain and who will not sell us grain with that certification on the inspection certificate, whether it is in the country or at the export location.

I am afraid I am much more cynical than the rest of the witnesses. I think the export elevators are the least of the problem, if you will. I believe the percentage of handlers using water is much higher the further back in the chain you go. And our experience trying to buy grain certainly bears that out.

Senator KERREY. Aren't you describing a market solution, a non-Government solution? You're essentially saying that you are not going to purchase grain unless certain requirements are met, and one of the requirements is moisture and water being added, and thus you are addressing part of the problem, are you not?

Mr. LUCAS. We solved it to the extent that we can.

Senator KERREY. You've had a positive impact on part of the problem. You have corrected part of the problem, both in the way you handle grain and the way others sell you grain?

Mr. LUCAS. We would like to think we have had that impact, yes. But we have not cured the abuse.

Senator DASCHLE. Let me grab some time here. I think Mr. Lucas was supposed to leave at 4:15 and it is now 4:15 and I have not had a chance to ask my first question, and I may learn from these hearings that taking my time first may be the proper thing to do.

Senator KERREY. I apologize.

Senator DASCHLE. No, no, no apology is necessary.

Mr. Lucas, if you have to go, I will certainly excuse you. I appreciate your contribution and thank you very much for being here.

Mr. LUCAS. I will stay for a few more minutes. I think I can still make it.

Senator DASCHLE. Let me just for the record be sure that we all understand here that we're talking about direct water application to the grain itself. We are not talking about fogging the air with a moisture fogger to suppress dust. I am drawing a distinction between fogging and adding water directly on the grain. We're talking about a prohibition on water on the grain, but do I understand that there was no opposition to fogging, as long as the water isn't applied directly on the grain?

Who can address that?

Mr. BOTOS. We favor banning the addition of water to grain or fogging.

Senator DASCHLE. You do not even support fogging?

Mr. BOTOS. Adding water to grain in the form of a fog is adding water to grain, in my opinion.

Mr. LUCAS. One of the few things in life you can count on is gravity, and that fog will eventually drift down, I believe, and I would agree. We would favor the banning of fogging and adding water in any form.

Senator DASCHLE. Okay. There appears to be a degree of skepticism about whether dust—we are talking here about a safety issue, largely. I mean, that is ostensibly why water is applied to grain in the first place, technically, for safety. But here you have got two of the largest grain companies in the world who have said that you can have safety without water. I think for the record it would be helpful if you could describe how you have acquired your confidence level in achieving safety without water.

Mr. Lucas, since you have to take off pretty soon, I'm going to ask you first.

Mr. LUCAS. I will respond to that by saying, of the facilities that we operate, and I am trying to think back over 20 years' experience with Louis Dreyfus Corporation, I do not believe we have ever had—I know we have never had a serious explosion and we have had some minor fires in some facilities, but I believe over all, our record would stand up with anybody's in the industry for safety for the employees with the systems that we employ, which are not water.

Mr. BOTOS. We have the same type of record and we satisfy ourselves with that by design, by proper design, and housekeeping and maintenance and adding motion detection devices and heat sensing devices to the operating equipment and maintaining that equipment on a regular basis. It's not been a problem for us.

Senator DASCHLE. Is that as feasible in a country elevator as it is in an export elevator?

Mr. BOTOS. The vast majority of the facilities that we operate in the United States and Canada are country elevators.

Senator DASCHLE. So you are saying that in all the years of experience that you've taken this approach, that your confidence level and safety generation is as high as somebody who would use water for safety purposes?

Mr. BOTOS. Yes. The locations where we have chosen to add oil for dust suppression, we have done it primarily for environmental reasons.

Senator DASCHLE. And is this primarily a pneumatic approach, or are there other things you do besides pneumatics?

Mr. BOTOS. Closed equipment, keep the grain and the grain dust together moving through the system. Do not let the grain dust escape from the grain stream.

Senator DASCHLE. What about the economic argument? What about the guy who says, well, that is fine, but you have got big bucks. I am out here as a sole country elevator. I need water because it is a cheaper approach.

Mr. BOTOS. Every one of our elevators operates on a local P&L concept. Each elevator has to stand on its own. It has to survive in the marketplace by the fact that it makes money, and that includes the equipment that we install in them or operate in them.

Senator DASCHLE. So their affiliation with you is no safety net? Economically? You do not give them technical assistance or some form of economic help to meet safety requirements?

Mr. BOTOS. Obviously, we provide an infrastructure of engineering expertise and advice and those kinds of things, but each of our locations is locally P&L driven. It is its own—it decides for itself how it is going to survive in the marketplace.

Senator DASCHLE. Dr. Steele, let me just ask you flat out. Do you think water today is applied for dust suppression and safety or is it applied for economic advantage?

Dr. STEELE. I will choose to go back to the original reason, perhaps, that oil additives were investigated, as well as water, and I believe that goes back primarily to the environmental emissions and airborne particles for worker safety. Certainly, water and oil can address those things.

It is not necessarily driven from the standpoint of, I believe, prevention of explosions within a facility. It is more from the emissions and environmental airborne particles.

I think that I will give a little bit of a personal opinion. The application of water used for dust control could be worked out by the industry. There are certainly abuses to the use of water and banning it will not change that. There will still be abuses, and there are other ways to add water to grain.

Senator DASCHLE. So in other words, you favor the status quo? You do not want to see any change?

Dr. STEELE. Mr. Chairman, personally I feel that it is a tool that the industry may need for environmental issues in the future. I am not sure that banning it at this point in time in the way that is proposed will keep it from being brought up a few years in the future in order to meet environmental emissions.

The same question was addressed a little bit in your opening remarks, I think, when you were saying that we're not quite sure how we're going to handle application of other materials using water and/or the fogging that was raised here, which is intended, I believe, to be directed toward environmental emissions.

Senator DASCHLE. Mr. Galliart, obviously, you have a different point of view in this.

Mr. GALLIART. Most assuredly.

Senator DASCHLE. It is interesting, we have a Department of Agriculture that apparently is split on the issue.

Mr. GALLIART. I did not know we were split. [Laughter.]

Senator DASCHLE. This is a surprise to you, is that right?

Dr. STEELE. Mr. Chairman, we are not really split. Part of what I was saying is, I see it as a tool that I'm not sure at the moment is the right time to ban it, because it may come up again later. And then there is the——

Senator DASCHLE. I am not sure I understand that concern. What do you mean, it may come up later?

Dr. STEELE. In order to maintain the emission regulations for release of particles and airborne particles for worker safety, respiratory type of particles.

Senator DASCHLE. In other words, you think that if it were banned, that it would have to be reinstated so as to deal with the problem more effectively?

Dr. STEELE. It's possible.

Senator DASCHLE. Well, how do you assess the experience of the two companies to your right which say that in all these years in their entire system, that has not been the problem?

Dr. STEELE. That depends on where we are going, I think, with the environmental emissions and how close we are going to get in and maintain worker safety. I am not, have not been in their facilities and I do not know of any particular test data that says for certain that those facilities meet respiratory requirements for workers.

Senator DASCHLE. Mr. Galliart, do you want to address that?

Mr. GALLIART. Well, surely we have a good deal of interest in the environment, and certainly the Environmental Protection Agency has been involved with the dust that escapes into the atmosphere. What will happen in the future, I am not sure I can respond to that.

I would like to mention this, with some fear of more questions from Senator Kerrey, I would say to you as an example of regulations in place, there are statutes for the prohibition of what we call deliberately deceptive grain loading practices. That means that the industry cannot deceptively load grain by placing poor quality grain on the bottom of a carrier and placing better quality grain on top of it to disguise it in such a way that we cannot find it by the procedures we use to sample grain.

We do not police all of the establishments that load grain, but on occasion, we find someone who has violated that regulation, and the action we take against that violator sends a strong message to those who might do it.

Senator DASCHLE. Isn't that the same concept as the Internal Revenue Service and a lot of others? I mean, the IRS certainly doesn't audit me every year, but the threat of an audit and the fact that I did get audited last year had a profound effect on my determination to work with my accountant to ensure that if ever I am audited again, I come out as well as I did last year.

Is that not part of what you are saying, that you create sort of a mentality that you may not get caught this year, but one of these years, you could see an FGIS inspector here, on site, without notification, and with adequate penalties associated with the violation of the law, the fear of violating the law will self-discipline the industry.

Is that a fair statement?

Mr. GALLIART. In my view, yes.

Senator DASCHLE. Since, Dr. Steele, you seem to be the contrarian, let me ask you that question. How does that—is that not a factor in what you consider to be the reaction of the industry?

Dr. STEELE. Would you make it more clear, the question that you're asking me?

Senator DASCHLE. The question I am asking, isn't the threat of getting caught a motivation in adherence to the law?

Dr. STEELE. I believe that the proposal places something on the books or register that bans the addition of water so that if someone is observed or you have sufficient evidence that water is being used in the manner described, that now you have a position to stand on and to enforce it. The threat certainly, knowing that that's there, would contribute probably to reduced misuse or abuse, abusive use of water, however you would define abusive use of water.

Senator DASCHLE. Doesn't that go, really, to the issue of regulation or statute, because clearly, a statute has the clout and the permanency that you are looking for here, as opposed to a regulation, which may be here today and gone tomorrow and certainly does not have the effect of law, in terms of adherence and participation?

Mr. Galliart, could you address that?

Mr. GALLIART. I can only address it by agreeing. We looked hard at other ways to handle this and we come up each time with the very clear understanding that we have no way to actually control this. If we allow some water, where do we stop?

We have indicated in our proposal and we have allowed 120 days for comments on our proposal to prohibit adding water to grain. If anybody has any suggestions or alternatives that are different from what we are suggesting and that would accomplish the same thing, we are open to any suggestions and thoughts.

Senator DASCHLE. Another issue I felt should be explored a little bit is, just why do people do this? Why do they abuse the application of water? I mean, obviously there's dust suppression and people can become too aggressive in overapplying water for dust purposes, but I have to believe that the economic motivation is a very real one.

There is an incredible economic incentive in adding water and, Mr. Lucas, you were using figures. I'd be interested if you could just repeat those, and I'd like to discuss those briefly.

Mr. LUCAS. The example I used was adding a half a percent of water weight to a 50,000 ton shipment of soybeans, and that represents in terms of value of that half a percent about $50,000. About a dollar a ton, about 3 cents a bushel.

Senator DASCHLE. So a half a percent adds $1 a ton in water value, and from your inspections, Mr. Stang, how much water was being applied? Was it a half a percent, less than, or more than?

Mr. STANG. We found that the rate of application was three-tenths of 1 percent numerous times in the elevator. It was three-tenths of 1 percent per elevation, elevation meaning inbound, in-house movement, and outbound.

Senator DASCHLE. Three-tenths of 1 percent?

Mr. STANG. Yes, sir.

Mr. LUCAS. Times three or four.

Mr. STANG. Times three approximately equals one. Three-tenths coming in, three-tenths inhouse, three-tenths going out, equals roughly 1 percent.

Senator DASCHLE. Oh, I see. So each time you add the value, which means that over a period of time, you're talking about $2.50, $3 a ton?

Mr. LUCAS. You could be.

Senator DASCHLE. Could be.

Mr. LUCAS. And I submit that is sufficient reason in itself, human nature being what it is, the economics being very plain, that that's sufficient reason to ban the practice altogether without the discussion of the other reasons, the quality issues and so forth.

Senator DASCHLE. Let me ask you whether you have any indication of trends in this case. Is this a trend going one way or the other, from what you've been able to determine in the industry?

Mr. Lucas?

Mr. LUCAS. There are two decided camps in the industry. There are those on the one side who, like ourselves, do not use water, do not favor the use of water, and there's another segment of the industry who believes that is a correct and proper thing to do, and those are two very different camps in the industry.

Senator DASCHLE. Mr. Stang, can you be any more precise? I understand Mr. Lucas' answer, but can you give any indication, do you have a sense of which direction this is going?

Mr. STANG. No, sir, I do not. Our last 18 months of work has dealt with those that apply water, and outside of that cycle, we have not had the opportunity to explore or evaluate what is happening, trend-wise, although we have seen, since the beginning of the investigation, a number of additional facilities within a company implementing water systems.

Senator DASCHLE. Well, I know that Mr. Lucas and others have to catch airplanes, according to my notes, and I realize we're bumping up against the time that I was told you had to be excused, but let me just ask if Senator Kerrey has any final questions prior to the time we——

Senator KERREY. I appreciate that, Mr. Chairman. I assume there will be, as I said, plenty of opportunity for further discussion.

Just a follow-on to this 0.3 percent. Does USDA through ARS have any recommendations out for use of water for dust suppression?

My understanding is ARS recommends 0.3 percent.

Dr. STEELE. Actually, I think if we were making a recommendation, it might be more like 2,000 parts per million or two-tenths of a percent.

Senator KERREY. You have no written record?

Dr. STEELE. The research went up as high, as I recall, 3,300 parts per million, and in terms of what was being looked at was effectiveness of one application on dustiness control, and as measured by a drop dustiness test, the highest application rate studied was the most effective at controlling the dust in samples that were taken very shortly after the one-time application of 3,300 parts per million.

The other thing that we mentioned or observed was that if you try to put much over 2,000 or so parts per million on it, it tends to

leave the grain kernels very moist. They will stick to one another. They will stick to inclined surfaces and not flow, so it is not very practical, really, to try to put that much water on at one particular point. You certainly could do that at the bottom of the elevator and at the top and put something like 1,500 to 2,000 parts per million on maybe at both places, at each spot.

Senator KERREY. And 2,000 parts per million is 0.2 percent?

Dr. STEELE. Yes.

Senator KERREY. So you recommend that the upper limit be 0.2 percent?

Dr. STEELE. We have always talked in terms of our discussion, I guess, with people and in reviews of what's out there, 2,000 parts per million was kind of a——

Senator KERREY. I just want to make a point. Isn't it true that we're dealing with a situation where on the one hand, the USDA is saying, "If you are going to do dust suppression, if you are going to use water, there's a recommended percent?"

Dr. STEELE. It's not——

Senator KERREY. If I own an elevator and I want to use water for dust suppression, can I go to ARS or Extension or someplace and get information that would give me some guidance as to how to use water for dust suppression based on research published by USDA?

Dr. STEELE. I do not believe there's anything like a Government regulation, nor do I——

Senator KERREY. No, perhaps a recommendation?

Dr. STEELE [continuing.] Know of any type of Extension Service recommendation for that. There are technical publications on what was used in the tests.

Even the oil, for example: The tests were done at 400 and 800 parts per million with oil——

Senator KERREY. You are saying, you've got a test in ARS that shows 2,000 parts per million or about 0.2 percent, which is——

Dr. STEELE. It was the observation that at that level, the grain started to stick together and would not flow very well, so it becomes rather impractical to try to apply more than that for dust suppression at one particular spot.

Mr. GALLIART. Even if we allowed 0.2 or 0.3 percent, we would——

Senator KERREY. Actually, I'm not trying to make the point that we should necessarily allow it. I'm trying to ascertain as to whether or not there's some rational explanation why somebody is using 0.3 percent, that it might be, in fact, connected to some research that the Government has done as to what works and what doesn't work. It's not necessarily an allowed limit or anything like that, but we've done some research to indicate that there's a percentage that might be effective for dust suppression.

Mr. GALLIART. You have the study and that's at three-tenths?

Dr. STEELE. Yes. The study went as high as 0.33, actually, or .34, I do not remember which it was. So the conclusion, I believe, from that technical paper was that 0.3 is effective.

Senator KERREY. Yes, but the point that I'm making is it's a fact that people are at 0.3, and that level doesn't necessarily come as an accident. I mean, this value of 0.3 that yields potential for abuse is

there at least in part as a consequence of research that the Government has done on the question of water use for dust suppression.

Dr. STEELE. Yes. The study went as high as 0.33 or 0.34. I don't recall which. Then the interpretation might be from the summary, well, that was still getting better or more effective at that level, so let's use 0.3 percent as an effective level for discussion on dust control.

Senator KERREY. Mr. Chairman, I do not want to stretch this any longer, either. There's unquestionably a problem and I appreciate your holding this hearing to call attention to it.

Dr. STEELE. I was going to make one other comment about mineral oil and soybean oil, that we use 200 parts per million of that.

Senator KERREY. Yes?

Dr. STEELE. Actually, 400 or whatever might be more effective, but the Food Safety people only approve 200 in the case of mineral oil.

Senator KERREY. There is no question in my mind that there's a problem. I appreciate your calling attention to it, and I will participate in constructively finding a solution. I want to make certain that we, number one, identify the size of the problem and then, number two, that we apply the correct solution that is appropriate to the problem, and three, we talk through potential consequences of the solution. It would not be the first time in my political career, and that's about 9 years, now, where I have solved one problem and created a bigger one than I solved.

You may have participated in things like that. I certainly have, and I want to make certain that does not occur here.

Finally, I just think we have to be very careful if this is the principle we're going to apply that we be prepared, perhaps, to apply it in other areas. It may be the exact regulatory principle to apply, because I know I hear an awful lot of concern coming from producers about grain quality. Constant problems in grain quality. They produce, they sell, the foreign buyer says it wasn't the quality that they wanted, and the producer says it was a quality product when it was sold, and all of a sudden it reaches the marketplace and it's not.

It seems to me that the general problem that we're dealing with here is trying to stay competitive and keep the producer in a position where they can stay profitable.

Again, Mr. Chairman, I really appreciate your holding the hearing.

Senator DASCHLE. Thank you, Senator Kerrey, and thank you to the witnesses. We appreciate it. It was a good hearing. We certainly got the balance we were looking for, and we will proceed from here.

[Whereupon, at 4:41 p.m., the subcommittee was adjourned, subject to the call of the Chair.]

[Material submitted for the record follows:]

APPENDIX

MEMORANDUM

DATE: September 3, 1993

FROM: Richard Hess, Senator Tom Daschle's office

SUBJECT: **FGIS reauthorization legislation**

The U.S. Department of Agriculture's Federal Grain Inspection Service (FGIS) is responsible for designing grain standards that effectively communicate the storability and end-use characteristics of grain, maintaining and supervising the official inspection system, and conducting mandatory inspections of export grain. FGIS was last reauthorized in 1988, and this authority expires September 30, 1993.

The Subcommittee on Agricultural Research, Forestry, and General Legislation has conducted frequent and intensive oversight activities on FGIS. The oversight included a year-long investigation by the General Accounting Office. On May 13, 1993, the subcommittee held a hearing to examine opportunities to improve the operations of FGIS. Among other witnesses at that hearing, GAO presented the results of their investigation.

The hearing demonstrated a consensus of views, with disagreement coming from some interest groups, that has been incorporated into the legislative proposal. Accompanying this memo for your review, is a *discussion draft* of legislation to reauthorize FGIS.

Senator Daschle invites your input on any aspects in this draft of concern to you and is especially interested in your comments regarding the provision on page 5, lines 19–23. This draft language has been proposed to codify the USDA regulatory proposal to ban the addition of water to grain for any purpose other than processing. We welcome your comments on both the USDA proposal and the proposal to codify it.

In summary the FGIS Reauthorization Legislation would:

1. Extend FGIS' authority to collect fees to cover the cost of administration and supervision of the official inspection system through September 30, 2003. The 40-percent limitation on administrative and supervisory costs would also be extended.
2. Extend appropriations authority to September 30, 2003. Bill report language would emphasize that standardization activities related to the official inspection system are to be funded with appropriations and not user fees.
3. Limit the use of official inspection fees, collected by federally designated State agencies, to pay for inspection activities only.
4. Expand the authority of FGIS to work with the Canadian government in carrying out official inspections in Canadian ports.
5. Authorize FGIS to conduct pilot tests where more than one official designated agency is allowed to offer services within the same territory.
6. Expand FGIS grain licensing authority beyond only employees of official agencies to include contract inspectors.
7. Prohibit the addition of water to grain for any purpose, including dust control, other than in conjunction with a processing activity.
8. Increase the penalty for violations, making willful violations of the law (i.e., deceptive loading and manipulation and falsification of weights) felonies rather than misdemeanors.
9. Eliminate the 3-month report to Congress on official complaints. Congress would continue to receive a summary of official complaints in the annual report
10. Authorize FGIS to provide, on a fee basis, commercial equipment testing and other services.
11. Authorize FGIS to offer "appropriate courtesies" to foreign officials and visitors.

12. Classify violation of a subpoena as a misdemeanor.

13. Authorize appropriation only of such sums necessary after taking into account the user fees authorized by the Act and the bill's amendments.

14. Grant broader authority for FGIS to work with technical or scientific organizations in addition to the National Institute on Science and Technology (NIST) and the National Conference on Weights and Measures to promote greater uniformity in commercial grain inspection results.

The bill will *not*: a) authorize user fees to pay for FGIS standardization activities; or b) authorize private official inspection agencies to perform mandatory official export inspections.

Please call Richard Hess at 202-224-2321 with any questions.

103D CONGRESS
1ST SESSION

S. _____

IN THE SENATE OF THE UNITED STATES

Mr. DASCHLE introduced the following bill; which was read twice and referred to the Committee on _____

A BILL

To amend the United States Grain Standards Act and the United States Grain Standards Act Amendments of 1988 to extend the authority of the Federal Grain Inspection Service to collect fees to cover administrative and supervisory costs, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; REFERENCES.**

4 (a) SHORT TITLE.—This Act may be cited as the
5 "United States Grain Standards Amendments Act of
6 1993".

7 (b) REFERENCES TO UNITED STATES GRAIN STAND-
8 ARDS ACT.—Except as otherwise expressly provided,

1 whenever in this Act an amendment or repeal is expressed
2 in terms of an amendment to, or repeal of, a section or
3 other provision, the reference shall be considered to be
4 made to a section or other provision of the United States
5 Grain Standards Act (7 U.S.C. 71 et. seq.).

6 **SEC. 2. EXTENSION OF AUTHORITY TO COLLECT TO COL-**
7 **LECT FEES TO COVER ADMINISTRATIVE AND**
8 **SUPERVISORY COSTS.**

9 (a) IN GENERAL.—Section 2 of the United States
10 Grain Standards Act Amendments of 1988 (Public Law
11 100–518; 102 Stat. 2584) is amended by striking "1993"
12 and inserting "2003".

13 (b) LIMITATION ON ADMINISTRATIVE AND SUPER-
14 VISORY COSTS.—Section 7D (7 U.S.C. 79d) is amended—

15 (1) by striking "inspection and weighing" and
16 inserting "services performed"; and

17 (2) by striking "1993" and inserting "2003".

18 (c) REAUTHORIZATION OF APPROPRIATIONS.—Sec-
19 tion 19 (7 U.S.C. 87h) is amended by striking "1993"
20 and inserting "2003".

21 **SEC. 3. USE OF INSPECTION AND WEIGHING OFFICIAL IN-**
22 **SPECTION AND WEIGHING IN CANADIAN**
23 **PORTS.**

24 (a) INSPECTION AUTHORITY.—Section 7 (7 U.S.C.
25 79) is amended—

1 (1) in subsection (f)(1)(A)(vi), by striking "or
2 other agricultural programs"; and
3 (2) in the second sentence of subsection (i), by
4 inserting before the period at the end "or as other-
5 wise provided by agreement with the Canadian Gov-
6 ernment".
7 (b) WEIGHING AUTHORITY.—Section 7A (7 U.S.C.
8 79a) is amended—
9 (1) in the second sentence of subsection (c)(2),
10 by inserting after "shall be deemed to refer to" the
11 following: " 'official weighing' or";
12 (2) in the second sentence of subsection (d), by
13 inserting before the period at the end "or as other-
14 wise provided by agreement with the Canadian Gov-
15 ernment"; and
16 (3) in the first sentence of subsection (i), by in-
17 serting before the period at the end "or as otherwise
18 provided in section 7(i) and subsection (d) concern-
19 ing official inspection and official weighing at Cana-
20 dian ports".
21 **SEC. 4. PILOT PROGRAMS FOR PERFORMING INSPECTION**
22 **AND WEIGHING AT INTERIOR LOCATIONS.**
23 (a) INSPECTION AUTHORITY.—Section 7(f)(2) (7
24 U.S.C. 79(f)(2)) is amended by inserting before the period
25 at the end the following: ", except that the Administrator

is authorized to conduct pilot programs of limited duration to determine whether it may be possible to allow more than one official agency to carry out the inspection provisions within a single geographical area without undermining the policy stated in section 2".

(b) WEIGHING AUTHORITY.—The second sentence of section 7A(i) (7 U.S.C. 79a(i)) is amended by inserting before the period at the end the following: ", except that the Administrator is authorized to conduct pilot programs of limited duration to determine whether it may be possible to allow more than one official agency to carry out the weighing provisions within a single geographic area without undermining the policy stated in section 2".

SEC. 5. LICENSING OF INSPECTORS.

Section 8 (7 U.S.C. 84) is amended—

(1) in subsection (a)—

(A) in paragraph (1) of the first sentence, by inserting after "and is employed" the following: "or is supervised under a contractual arrangement"; and

(B) in the second sentence, by striking "No person" and inserting "Except as otherwise provided in sections 7(i) and 7A(d) concerning official inspection and official weighing in Canadian ports, no person";

(2) in the first proviso of subsection (b), by striking "independently under the terms of a contract for the conduct of any functions involved in official inspection under this Act" and inserting "under the terms of a contract"; and

(3) in subsection (d)—

(A) by inserting after "Persons employed" the following: "or supervised under a contractual arrangement"; and

(B) by inserting after "including persons employed" the following: "or supervised under a contractual arrangement".

SEC. 6. PROHIBITED ACTS.

Section 13 (7 U.S.C. 87b) is amended—

(1) in subsection (a), by striking paragraph (11) and inserting the following new paragraph:

"(11) violate section 5, 6, 7, 7A, 7B, 8, 11, 12, 16, or 17A;"; and

(2) in subsection (d), by adding at the end the following new paragraph:

"(4) Notwithstanding any other provision of this section, no water shall be added to grain for purposes other than milling, malting, or similar processing operations."

1 **SEC. 7. CRIMINAL PENALTIES.**

2 Section 14(a) (7 U.S.C. 87c(a)) is amended by strik-
3 ing "shall be guilty of a misdemeanor and shall, on convic-
4 tion thereof, be subject to imprisonment for not more than
5 twelve months, or a fine of not more than $10,000, or
6 both such imprisonment and fine; but, for each subsequent
7 offense subject to this subsection, such person".

8 **SEC. 8. TESTING OF WEIGHING EQUIPMENT AND INSPEC-**
9 **TION INSTRUMENTS; OTHER SERVICES;**
10 **COURTESIES TO REPRESENTATIVES OF FOR-**
11 **EIGN COUNTRIES.**

12 Section 16 (7 U.S.C. 87e) is amended—

13 (1) in subsection (b), by striking the third sen-
14 tence; and

15 (2) by adding at the end the following new sub-
16 sections:

17 "(g)(1) Subject to the other provisions of this sub-
18 section, the Administrator may provide for the testing of
19 weighing equipment used for purposes other than weighing
20 grain in accordance with such regulations as the Adminis-
21 trator may prescribe at fees established by regulation or
22 contractual agreement.

23 "(2) Testing authorized by paragraph (1) may not
24 conflict with or impede the objectives of this Act.

25 "(3) Fees authorized by paragraph (1) shall be rea-
26 sonable and shall cover, as nearly as practicable, the esti-

1 mated costs of the service incident to performance of the
2 testing. The fees shall be deposited into the fund created
3 by section 7(j).
4 "(h)(1) Subject to the other provisions of this sub-
5 section, the Administrator may provide for the testing of
6 grain inspection instruments used for commercial inspec-
7 tions in accordance with such regulations as the Adminis-
8 trator may prescribe at fees established by regulation or
9 contractual agreement.
10 "(2) Testing authorized by paragraph (1) may not
11 conflict with or impede the objectives of this Act.
12 "(3) Fees authorized by paragraph (1) shall be rea-
13 sonable and shall cover, as nearly as practicable the esti-
14 mated costs of the service incident to performance of the
15 testing. The fees shall be deposited into the fund created
16 by section 7(j).
17 "(i)(1) The Administrator is authorized to perform
18 such other services as the Administrator considers nec-
19 essary to effectuate the purposes and provisions of this
20 Act in accordance with such regulations as the Adminis-
21 trator may provide.
22 "(2) In addition to the fees authorized by sections
23 7, 7A, 7B, and 17A and this section, the Administrator
24 shall prescribe, charge, and collect reasonable fees to cover
25 the estimated costs of the service incident to the perform-

1 ance of a service authorized by paragraph (1), but not in-
2 cluding standardization, compliance, and foreign monitor-
3 ing activities.

4 "(3) As nearly as practicable and after taking into
5 consideration any proceeds from the sale of any samples,
6 the fees authorized by this subsection shall cover the costs
7 of the service incident to the performance of a service au-
8 thorized by paragraph (1), including administrative and
9 supervisory costs related to the performance of the service.

10 "(4) The fees, and the proceeds from sales of any
11 samples obtained that become the property of the United
12 States, shall be deposited into the fund created by section
13 7(j).

14 "(j) The Administrator is authorized, under such
15 rules, regulations, and instructions as the Administrator
16 may prescribe, to extend, or to permit authorized person-
17 nel to extend, appropriate courtesies to official representa-
18 tives of foreign countries in order to establish and main-
19 tain relationships to carry out the policy stated in section
20 2.".

21 SEC. 9. VIOLATION OF SUBPOENA AS MISDEMEANOR.

22 Section 17(e) (7 U.S.C. 87f(e)) is amended by strik-
23 ing "the penalties set forth in subsection (a) of section
24 14 of this Act" and inserting "imprisonment for not more

1 than 1 year or a fine of not more than $10,000, or both
2 the imprisonment and fine".

3 **SEC. 10. LIMITATION ON APPROPRIATIONS.**

4 Section 19 (7 U.S.C. 87h) is amended by striking
5 "sections 7, 7A, and 17A of this Act" and inserting "sec-
6 tions 7, 7A, 7B, 16, and 17A".

7 **SEC. 11. STANDARDIZING COMMERCIAL INSPECTIONS.**

8 Section 22(a) (7 U.S.C. 87k(a)) is amended by strik-
9 ing "and the National Conference on Weights and Meas-
10 ures" and inserting ", the National Conference on
11 Weights and Measures, or other appropriate govern-
12 mental, scientific, or technical organizations".

73-026 O - 94 - 3

EXAMINING THE USE OF ADDITIVES TO CONTROL GRAIN DUST

FINAL REPORT

Submitted to
Fire and Explosion Research Council
National Grain and Feed Association
P. O. Box 28328
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by

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EXECUTIVE SUMMARY

A series of tests were conducted to study the effectiveness of water, deodorized soybean oil, and mineral oil as dust controlling additives in large scale grain handling operations of corn, wheat, and soybeans. All additives were sprayed on grain as it was transferred from one storage bin to another. The flow rates of the additives were regulated through a control valve by compressed nitrogen. It was found that the additives were best applied by continuously spraying both the top and the underside of the grain stream, at the first belt transfer point after the grain left the storage bin. In extremely cold weather, it was necessary to heat the additives to achieve efficient spraying.

Between 0.03 and 0.10% by weight of soybean oil applied to all three grains and 0.02 and 0.08% by weight of mineral oil applied to corn were effective in reducing dust emissions. The ability of mineral oil to control dust in corn was not reduced after a three months' storage of the treated grain. The amount of oil needed for optimum effectiveness ranged from 0.02 to 0.05%. Adding 0.17 to 0.30% water by weight to corn was temporarily effective in controlling dust emissions. The average weight loss of the grain stream due to dust dispersion was approximately 0.14% each time a grain was handled. When an additive was present, this loss was reduced to 0.035% or less. An application level of 0.3% water to corn reduced the gallery floor dust concentration by at least 80%, and an application rate of 0.03% soybean or mineral oil at the same location reduced the dust concentration by more than 90%.

Minimum modifications of the existing facilities were needed to undertake these trials, and under normal conditions the operation of an additive spraying unit should be entirely automatic and require only periodic inspection to ensure proper mechanical functioning and flow rates.

I. INTRODUCTION

Whenever grain is handled or processed, dust is generated. This situation produces the potential for a dust explosion (Aldis and Lai, 1979) and causes the deterioration of air quality in and near handling and processing facilities (Rankin et al., 1979). These hazards and the resulting financial losses are of major concern to the grain industry.

Dust collection is a means of checking grain dust emission by controlling the ventilation in a specifically confined space wherever grain is handled. However, in many existing grain elevators, grain is not loaded or unloaded in a confined or controlled space. Furthermore, ventilation dust control may sometimes allow explosible mixtures to occur under adverse conditions (Bartknecht, 1981). In addition, the energy required to employ ventilation controls may exceed the energy required to move the grain.

Although separating dust from ventilated dust-laden air by bag filters, electronic precipitators, and cyclone collectors has been proven effective (Brown and Reed, 1926; Martin and Stephens, 1977), the costs of installation, operation, and maintenance of ventilation equipment are high. Capital costs for installation have been estimated at between $3 and $5 per cubic feet per minute (cfm) of desired air control, which amounts to between $250,000 and $1,000,000, depending on the size of the grain elevator. Annual operating costs add an additional 20% to the capital investment cost (Maness, 1978). Thus, this method of dust control is extremely costly.

The idea of applying liquid sprays over grain to control dust generation is not new. As early as 1908, water and oil were used to suppress the formation of dust on highways (Hubbard, 1908). Moen and Dalquist (1952) were granted a patent for the batch process of applying an oil-water emulsion of 0.02-0.08% to grain, and agitating the grain as it was applied. Cocke et al. (1978) applied mineral oil to wheat grain in a small batch rotating cylinder

and found that the application of as little as 0.07% oil reduced dust levels by more than 92%. The additives also reduced dust levels in shelled corn and soybeans.

Pilot-scale studies conducted at the U.S. Grain Marketing Research Laboratory (Lai, et al., 1979; Lai et al., 1981) also tested the effectiveness of liquid additives in controlling grain dust. Results showed that when corn and wheat were treated with 0.02 and 0.06% soybean or mineral oil, the dust emitted during handling was drastically reduced. Laboratory analyses of the treated wheat revealed no adverse effect on milling or baking quality of the flour caused by the application of oil.

This study sought to determine those application levels at which oil and water were effective in controlling airborne dust in an operating grain elevator. Edible oil (deodorized soybean oil), mineral oil, and water were applied to corn, wheat, and soybeans during conventional handling in a commercial grain elevator (The Ohio Farmers' Grain and Supply Assoc., P. O. Drawer M., Fostoria, OH 44830).

II. MATERIALS AND METHODS

A. Test Facilities

1. Grain Handling System

Figure 1 is a diagram of the grain handling system at The Ohio Farmers' Grain Elevator in Fostoria, Ohio, where the tests were conducted. Grain was moved from a storage bin on a 36-inch wide enclosed conveyor belt running at 400 ft/min. At site A the first belt transferred grain onto a second similar belt (A, Fig. 1). From site A the grain was moved 100 feet to site B, the end of the second belt (B, Fig. 1). Grain was discharged from the belt into 25 feet of spouting where it fell by gravity and entered the boot on the descending side of the bucket elevator. It was then elevated 240 feet at a flow

rate of 10,000 bu/hr and discharged into spouting. The grain fell through the spouting into a 2500-bushel garner and then into a 2500-bushel scale. From the scale, the grain entered a distributor that directed the flow to site C, the beginning of the gallery belt (C, Fig. 1). The vertical distance of the fall of grain from the head of the leg to the gallery belt was 100 feet. Grain was then moved 85 feet from site C to site D, the location of the first tripper, where it was transferred to the house belt (D, Fig. 1). The time required for grain to move from site A to sites B, C, and D was 15, 40, and 50 sec., respectively. Grain was continuously moved on the house belt to site E, the location of the second tripper. The second tripper was stationed at the entrance to one of three similar test bins (E, Fig. 1). Each test bin was 114 feet deep and had a capacity of 9,000 bushels. Distances from site D to the three bin sites were 25, 310, and 320 feet. Total lapsed times for grain to move from site A to each of the three bin sites were 40, 70, and 71 seconds, respectively.

2. In House Dust Control Systems

The grain elevator was equipped with several dust control systems employing bag house filters to separate dust from air. After the dust was separated from the air, it was discharged through ducts into a dust bin. The lower system collected dust through ducts located at the end of the second enclosed belt and in the boot of the bucket elevator (B, Fig. 1). The upper system collected dust from the head of the bucket elevator and the garner (C, Fig. 1). The dust control system for the gallery collected dust from hoods over the beginning of the gallery belt and the first tripper (C & D, Fig. 1). The system in the headhouse collected dust from the hoods over the beginning of the house belt and second tripper (D & E, Fig. 1).

3. Additive Spraying System

Liquid was applied by nozzles from a pressurized, heated 60-gallon tank; its flow rate was controlled by a pressure regulator (Fig. 2). Nozzles were selected from a set of floodjet tips Nos. TK 1.5, TK 2, TK 2.5, TK 3, TK 5, TK 7.5, TK 10, TK 15, and TK 20 (Spray System Co., Wheaton, IL 60187) ranging in delivery capacity from 0.15 to 4.0 gal/min. The different size tips were used to accommodate the wide range in application rate of additives. The nozzle TK 2 was selected specifically because it produced a uniform coverage at low spraying heights and pressures, and it provided an adjustable spray angle. A cylinder of compressed nitrogen served as a pressure source in order to avoid the possible oxidation of soybean oil by compressed air. However, compressed air would have been adequate for practical purposes since the application time was kept relatively short. The pressurized tank was wrapped in insulation and provided with an electric immersion heater (0.5 kW) in order to preserve the fluidity of the oil in the freezing temperatures anticipated during the winter experiment. A thermometer was installed in the line leading to the nozzles. All plumbing in the spraying system was ½-inch in diameter.

4. Test Sites

a. Dust collection sites

The dust discharge duct at each of the sites at B, C, between C and D, and between D and E (Fig. 1) was bypassed so that the dust could be collected in bags.

b. Additive application site

At site A (Fig. 1) panels were removed from the conveyor enclosures so that two wide angle flat spray nozzles (TK 2) could be installed to spray liquid on the moving grain. One nozzle sprayed the top surface of grain near the end of the first belt; the second sprayed the opposite surface of grain falling vertically from the first belt to the second belt (A, Fig. 1).

c. First grain and dust sampling site

At site B (Fig. 1) there was an inspection door about 10 feet from the end of the enclosed belt through which samples could be scooped from the moving grain. Midway between the doorway and the end of the belt there was a 12-inch square inspection hole that provided an access for monitoring dust emissions. Airborne dust samples were collected by a Hi-Vol air sampler that sucked air from the inspection opening. Dust was collected on an 8- by 10-inch type A fiberglass filter mounted face down directly over the opening. The Hi-Vol air sampler at site B sampled dust concentrations inside the enclosed belt housing. There was a dust control duct about 4 feet from the opening and the grain surface was about 18 inches below the opening.

d. Second grain and dust sampling site

Site C (Fig. 1) provided a second location to scoop samples from the moving grain. In addition to grain sampling, a second Hi-Vol air sampler was placed near the trolley belt to monitor dust emissions. This sampler was mounted three feet above the floor on a stand with the 8- by 10-inch filter facing up. In contrast to the location of measurements at site B, site C was in the open area about 3 feet from the belt and about 6 feet from the point where grain was received onto the belt.

e. Test bin sites

Each test bin, site E (Fig. 1), had two bin openings. One opening was used by the tripper to deliver grain to the bin. The second opening provided access for the equipment monitoring the dust emissions inside the bin. A Hi-Vol air sampler was used to collect airborne dust samples from inside a test bin 18 inches from the top of the bin. The filter holder inside the bin was connected to the Hi-Vol motor outside the bin by a 10-foot long, 2-inch diameter pipe. The airflow gauge was calibrated in the laboratory with the calibration orifices on the end of the extension pipe.

Dust cloud opacity inside the bin was measured with a light-beam system developed at the U.S. Grain Marketing Research Laboratory (Lee et al., 1981). Two light-beams were suspended by aircraft cables at distances of 5 and 15 feet from the roof of the bin. The top lightbeam was about 1.5 feet underneath the Hi-Vol sampler.

B. Test Procedures

A test sequence included two control lots of grain without additives, one with the dust control system on, and one with the dust control system off. High, medium, and low levels of additives were tested with the dust control system off. At least one test with each additive was run with the dust control system on to obtain data on the difference in amount of dust collected by the in-house dust control system.

1. Grain Lots

Corn, wheat, and soybeans that had been received into storage in the summer and fall of 1980 were selected for the study. The yellow dent corn was from the 1980 fall harvest in Ohio. It had a moisture content ranging between 14.5 and 15.5% and a BCFM content ranging between 1 and 11%. Moisture content ranged between 11.4 and 12.6% for wheat and between 11.1 and 11.7% for soybeans.

2. Additives

Water, deodorized soybean oil, and mineral oil were selected as dust control additives. Carnation mineral oil, which is not subject to either hydrolytic or oxidative rancidity, was obtained from Witco Chemical Corp. (Petrolia, PA). Deodorized soybean oil was obtained from Archer Daniels Midland (ADM) (Decatur, IL). All three additives were applied to corn. Only soybean oil was applied to soybeans and wheat.

3. Application Techniques

In existing grain elevators, the dust control zones are located at transfer points. Typical locations are bin exits, belt-to-belt transfers, bucket elevator boots, etc. These transfer points are dusty primarily because when grain passes through, air movements cause particulate matter to separate from the bulk material. More fine particles are released at each subsequent transfer. For this reason, it is important to introduce the additive close to or at the origin of grain movement. Moreover, agitation of grain at a transfer point effectively mixes the grain and the additive, a process which continues through each transfer. In the experimental arrangement, a single spray site was selected to provide the ease of access and to vary the distance between grain bin exits. Nozzles were located at the end of the belt coming from storage bins, a point which made several grain test lots available for treatment. After treatment each grain was handled almost identically except for the final distance to receiving bins.

At a flow rate of 10,000 bu/hr, the depth of the grain on a 36-inch wide belt was about 6 inches at the center of the belt. One nozzle sprayed additive on the top surface of the grain (Fig. 3). Four feet downstream, the grain dropped to another transfer belt and a second nozzle sprayed the underside of the grain stream as it fell. Thus, the grain stream was sprayed from both top and bottom. Some immediate agitation and mixing occurred when the grain stream dropped onto the second belt. Although oil droplets were seen to bounce off the grain stream and adhere to the belt, we did not observe any accumulation of oil on the enclosed conveyor system.

C. Sample Analysis Procedure

1. Grain Samples

A quart grain sample was collected near the end of a test at site 3 (Fig. 1). These samples were placed in quart glass canning jars for analysis

at the U.S. Grain Marketing Research Laboratory after each test. At the laboratory, the fine material content of these samples were measured after sieving for 30 strokes on a Dean Gamet shaker. A 12/64-inch round hole sieve was used for corn and soybeans and a 0.064 x 3/8-inch oblong hole sieve was used for wheat. These samples were then shipped to a U.S. Board of Appeals office for determination of the grade.

Approximately 2 pints of grain sample were scooped from the belt at the beginning, middle and end of grain flow at site C (Fig. 1). Immediately after each sample was collected, the moisture content was measured with a Motomco moisture meter. Additional 2 cubic inch (33 ml) samples were collected at site C for an immediate drop test dustiness analysis using a HIAC particle counter (High Accuracy Particle Counter Co., Menlo Park, CA).

The HIAC drop test analysis involved the creation of a dust cloud by causing dusty material to fall through air and hit a surface. If two materials which differ in dustiness are handled in an identical manner, the two resulting dust clouds will differ with respect to number and size of particles. Should there be no difference in number or size of particles in the dust cloud, the two materials are considered equally dusty. In the drop test, a 2 cubic inch volume (33 ml) of grain was dropped 20 inches (50 cm) and reached a velocity of 600 ft/min (304 cm/sec) at the point of impact. The dust cloud was confined inside a 1.6-inch (4.1 cm) diameter column where it was sampled. The HIAC particle counter computed the number of particles that fell within a calibrated size range, and from the number and size of dust particles measured, the particle size distribution and concentration are calculated.

The sampling for the drop test started at the beginning of grain flow and proceeded at 2-minute intervals. Dust concentrations from the 7 or 8 drop test measurements were averaged to obtain a single value for each test.

The drop test provided a measurement of dustiness dependent only on the grain and independent of the grain handling facility. For example, if fugitive dust from grain handled outside a given test environment was introduced into a test environment, the test monitoring sites would measure the fugitive dust plus the dust generated during the test. Only the dust originating from grain samples was detected by the drop test, and fugitive dust from grain handled outside the test environment was prevented from interfering in the total counts.

2. Dust Samples

a. Tailing dust

For tests in which the dust control system was on, dust was collected in the basement, gallery, garner, and D house dust control system outlets, put into 50-pound bags, and weighed. The weight of the dust collected from those locations was a measure of the dustiness of the grain during handling. Approximately 7 ounces (200 gms) of the dust from each dust control system was placed in a plastic bag for later analysis of particle size distribution at the laboratory. The coarse particle size analysis was determined after 10 minutes of sieving on a Fisher-Wheeler sieve shaker, using a set of U.S. standard No. 18-, 35-, 60-, and 120-mesh sieves. The dust that passed through the 120-mesh sieve was further sized using a sedimentation method with MSA equipment (Mine Safety Appliance, Pittsburgh, PA 15208).

b. Hi-Vol sampler dust

Whenever the quantity of dust on an 8- by 10-inch Hi-Vol filter exceeded 10 grams, the dust layer was removed for partial size analysis using a sedimentation method with MSA equipment. The sedimentation analyses expressed results in terms of the geometric median particle size and the geometric standard deviation, the two parameters of the log-normal distribution function (see e.g. Stockham, 1977). The coefficient of determination,

r^2, represented the degree of log-normality of the particle size distribution and a value of 1.0 for r^2 represented a perfect log-normal distribution.

3. Calibration of Instruments

a. Drop test HIAC particle counter

Air was drawn from the dust cloud into a HIAC model D-5-150 sensor at 78 ml/min and particles were counted and sized as they cast a shadow on the photodetector (Fig. 4). Constant airflow was maintained by a gear driven syringe pump operated by a syncronized motor. At the vena contractor of the nozzle, a collimated light source was directed through a window on one side onto a photodetector behind a window on the opposite side. The area of the particle divided by the area of the window was proportional to the light that was blocked out. As the particles passed through, a momentary change in signal from the photodetector occurred which equalled

$$E_p = \frac{A_p}{A_w} E_b \qquad (1)$$

where

E_p = pulse amplitude from photodetector

E_b = base output from photodetector

A_p = projected area of the particle

A_w = area of the window

For a spherical particle, the above equation became

$$E_p = \frac{0.7854d^2}{S^2} E_b \qquad (2)$$

where

S = side of square window

d = diameter of the spherical particle

b. Hi-Vol sampler

Before the additive tests began, each air sampler calibration was

checked in the USGMRL laboratory. Using a Bendix 3-1155-21 orifice-type calibration assembly and a differential manometer, the pressure-type airflow gauge was set to read 29.0 cubic feet per min at a manometer reading of 2.90 inches of water. This setting was taken from the calibration data supplied by the manufacturer. A Variac transformer was used to control the motor speed. The calibration setting was confirmed at two motor speeds: one was with a 5-hole orifice plate to simulate a dirty filter, and the other was without an orifice plate to simulate a clean filter. After tests in Ohio were completed, the air samplers were rechecked and it was confirmed that their calibrations had not changed.

c. LED-PT probe

The LED-PT probe was calibrated with neutral-density filters inserted into the light beam. This method of calibration made concentration measurements relatively independent of the particular LED-PT pair chosen. The light transmitted by the neutral density filters had been previously emitted by the LED. It was found that the variation of light transmission was a linear function of voltage drop across the PT ($r^2 = 0.96$ with 5 degrees of freedom). Thus, the voltage measurements could be used directly to obtain the ratio of light attenuation at any given time to light attenuation at the beginning of settling.

d. Additive spray nozzles

Calibration of the amount of oil and water added to the grain was conducted before each test. Two nozzles were removed from the installation and placed in a container to collect the liquid. At a preset liquid pressure, the liquid was allowed to flow for one minute. The pressure and the amount of liquid collected were recorded and checked with readings from the volumetric flow recorder. The liquid pressures measured were 10, 20, 30, and 40 psi. All tests were conducted in duplicate. The following correlation

equation was assumed:

$$p = aw^b \tag{3}$$

where

p = liquid pressure

w = liquid capacity in gal/min

a,b= constants correlation

The correlation coefficient was significant at 0.99. Given the predetermined percentage of treatment, x, the amount of liquid needed was determined by

$$w = G \cdot 56 \cdot x/60 \tag{4}$$

where

G = grain flow rate in bu/hr

x = application rate

w = liquid flow rate in lb/min

Consequently, by entering w from Eqn (4) into Eqn (3), we were able to determine the liquid pressure setting. This pressure setting corresponded to the predetermined treatment dosage.

4. Dust Emission Measurement

When grain was flowing, dust emissions were monitored by Bendix model 550, Hi-Vol, high volume air samplers (Bendix Environmental & Process Instrument Div.) at sites B, C, and E (Fig. 1). When the grain flow began, samplers were started and the clock time was recorded. When the grain flow ended the samplers were stopped and the clock time was again recorded. The airflow was held constant at 28 cubic feet per minute by an operator who monitored the airflow gauge and adjusted a Variac transformer connected to the Hi-Vol motor. The operator was also instructed to stop Hi-Vol sampling and record the time in the event that the filter became loaded with dust to the point that gauge flow rate could not be maintained at the designated

value of 28 cfm. Type A fiberglass filters used in the samples were weighed just before the start of a test and again at the end.

The dust cloud concentration inside the test bins, site E (Fig. 1), were also measured by a Hi-Vol air sampler. Since one of the most serious shortcomings of the data taken from Hi-Vol air samplers is their lack of information on the temporal and spatial characteristics of the dust dispersion, we added an array of two light-emitting-diode, phototransistor (LED-PT) pairs to give more information on the dust distribution (Martin et al., 1980). Dust concentration was monitored by the attenuation of light emitted from the light-emitting-diode (LED). The light was detected by a phototransistor (PT) matched to the spectral output of the LED (peak wavelength ≈ 930 nm). This procedure was used by Liebman et al. (1977) to monitor dust concentration during the propagation of coal dust fires and explosions. However, our probe differed from the one described by Liebman et al. (1977) by being windowless and was designed to operate with a longer light path to increase sensitivity.

Figure 5 is a sketch of the probe mounted on aluminum plates which in turn are mounted on four aluminum rods 0.5 inch (1.26 cm) in diameter. We chose a high-power LED that delivered 6 mW at a 10° beam angle and an appropriate detector (Texas Instruments TIL 31 and TIL-81, respectively). The distance between the LED and PT was 1.00 m. Dust was prevented from collecting on the optical surfaces of the LED and PT by a stream of air through the collimator from the compressed air supply, which did not affect the dust distribution significantly, because of its low flow rate. The airflow was adjusted so that a pressure equilibrium was reached between the collimator and the monitoring space whenever dust was dispersed. The air stream systems were checked at least twice each day during the test to make sure that the airsweeps were effective in preventing dust buildup.

The LED and PT were both powered by a 5V d.c. power supply. The electrical circuit is shown schematically in Fig. 6. The resistor R was chosen to give a light intensity that allowed the PT to operate in a linear range. Linearity of the response was tested and confirmed with a series of neutral-density filters inserted into the light beam. The 10 mΩ load resistor, R_2, was chosen to give maximum sensitivity and to allow isolation if multiple PT circuits were powered from the same power supply. The large value of R_2 reduced the response time of the circuits to approximately 5 ms, an adequate time for most explosion tests. If faster time response had been needed, a lower value of R_2 may have been used, at the expense of sensitivity.

III. RESULTS AND DISCUSSION

A. Ambient Conditions

Tests were conducted at Fostoria, Ohio, between December 7 and 12, 1980. Snow had fallen the week before. Daytime temperatures were in the middle 40's and night time temperatures in the upper 20's. Temperature in the basement of the grain elevator where the oil was applied was 30° F.

B. Time Sequence of Tests

Thirty-eight tests were conducted with corn, wheat, and soybeans using water, soybean oil, and mineral oil as test additives. The time sequence of the tests is given in Table 1 and in Figs. 7(1)-7(38). The dust concentration as measured by two LED-PT pairs are given in Figs. 7(1) through 7(38) for all 38 tests. The data show that adding soybean or mineral oil reduced dust emission at the bin overspace, an observation consistent with our findings from the high-volume air samplers.

In each of the first four runs, 5000-bushel lots were used. It was assumed initially that airborne dust inside the test bin would take the longest time to reach equilibrium and remain suspended longer after grain

stopped flowing than that of the dust at sample sites B and C. Site B was vented through a dust control duct whereas the bin was not vented. Site C was an open area where windows and other infiltration sources caused natural ventilation. The light attenuation data from the four initial tests showed a consistant and rapid dust cloud build-up rate during the first minute of grain flow followed by a fluctuating but relative constant dust cloud (Fig. 7(1)-7(4). When grain flow stopped, the rate of dust cloud dissipation was much slower than the rate of accumulation. It was also observed that even though the dust cloud concentration did not return to background or pretest level between successive replicated tests, the next test produced the same attenuation pattern and was essentually an extension of the first pattern. In other words, tests could be run back to back without introducing errors due to carry-over. Consequently, after the first four runs 2500-bushel lots were used to produce a grain flow rate of 10,000 bushels/hr at a running time of about 15 minutes.

Because we were limited by a tight schedule, we conducted tests continually. We realized that with this procedure some fine dust from a previous run was probably hanging in the air when the next test was started, and therefore, dust was carried from one test to the next. It would have been beneficial to have conducted an identical test on the grain handling system with no grain present, in order to have made an estimate of the background dust concentration and accumulation in the system.

C. Grain Samples

The moisture content and broken corn and foreign material content of corn samples are given in Table 2. All moisture contents were under 15.5%, the limit for No. 2 corn, and ranged between 14.3 and 15.5%. The 5000-bushel test lots for tests 1-4 had over 3.0% broken corn and foreign material which would make these lots grade less than No. 2 corn. Most 2500-bushel corn test

lots had less than 3.0% BCFM. Test No. 37 had the highest BCFM with 4.1%, but the sample sent to the BAR (Board of Appeals and Review) had only 3.0% and was graded No. 2 corn. The application of up to 0.33% water did not increase the moisture contents above the levels measured in the controls.

After the tests, samples of both the control corn and treated corn were sent in plastic bags to the Board of Appeals and Review for grading. The results are given in Table 3. For test No. 1, control test, the odor was rated COFO (commercially objectionable foreign odor). Test No. 37 odor was graded musty and test No. 36 odor was graded COFO, even though both were treated with mineral oil. The other three samples were graded No. 2 corn despite the fact that they were treated with vegetable oil. Because of the odor, samples from tests Nos. 36 and 37 were graded as sample grade yellow corn. Test No. 1 was graded sample grade because of high BCFM (>7%).

The moisture and fine material content of wheat are given in Table 4. The moisture content ranged between 11.5 and 12.2%, and the fine material content ranged from 0.26% to 1.58%. Board of Appeal gradings of those samples are given in Table 5. Only the 0.06% level sample treated with vegetable oil was graded as COFO.

The moisture content and fine material content of soybeans are given in Table 6. The moisture content ranged from 11.2% to 11.7%. Test No. 31 had the highest fine material content (9.01%). BAR gradings of the samples are given in Table 7. No objectionable odor was detected and all the samples were graded as No. 1 yellow soybeans.

D. Dust Emission

1. Corn

a. Dust concentrations

Table 8 presents the concentrations inside the enclosed transfer belt before entering the boot, at the open gallery, and inside the bin overspace

where the bin was being fi.'ed, as well as the dustiness of each control grain sample measured by the drop test. For comparison, data were recorded when the dust control system of the elevator was turned on and when it was off. The Hi-Vol sampler at the gallery (C, Fig. 1) was operated at 28 cfm during the first 4 tests, and from test No. 5 on, was operated at 60 cfm (full voltage). However, the Hi-Vol sampler installed at the enclosed belt (B, Fig. 1), had no Variac transformer available to control motor speed (airflow rate). The data in Tables 8 and 9 show that higher dust concentrations were measured at 28 cfm than were measured at 60 cfm. In other words, a 60 cfm airflow rate in the open area removed dust particles faster than that of 28 cfm airflow rates.

Water was applied at levels of 0.17%, 0.30%, and 0.33% (Table 9). When the dust control system was off, the dust concentration inside equipment at the pre-leg averaged 0.860 gm/m^3 and was reduced to 0.459 gm/m^3 when the system was on. The percentage of reduction was 41.2% for 0.18% added water and 52.1% for 0.30% added water (Table 10). This reduction indicates that the effect is evident 15 seconds after application (it took 15 seconds for the grain to travel from the point of application to the point of dust measurement) and that it has taken effect before the grain entered the boot of the leg when the dust control system is off. When the dust control system was on, an application of 0.18% water reduced the dust concentration at the gallery from 0.008 gm/m^3 to 0.006 gm/m^3 and application of 0.30% reduced it further to 0.0017 gm/m^3. This reduction corresponds to 20.0% for 0.18% added water and 77.3% for 0.30% added water. Grain dustiness was decreased substantially by at least one order of magnitude.

When the dust control system was off, concentration of dust at the pre-leg was substantially increased, but the concentration in the bin overspace remained the same. This observation is expected because there was no

control system inside the grain bin. The drop tests for grain dustiness were not measurably affected by turning off the dust control system. This observation is consistent with the fact that the dust control system was not intended to remove any dust from the grain.

The results found with oil additives are similar to those found for 0.3% water. Concentration of dust in experimental lots of corn treated with soybean oil are described in Table 11. Three levels of oil were used, 0.03, 0.06, and 0.10%. The dust concentration at the pre-leg was not affected much by the application rate, which might have been due to inadequate mixing. After entering the boot, the dust concentration at the gallery was reduced by half, and at the bin overspace it was reduced by one order of magnitude. Significantly, the dustiness of the grain itself was reduced by at least two orders of magnitude. Again the dust concentration in the bin overspace did not increase when the dust control system was turned off.

When the dust control system was on, an application rate of 0.03% soybean oil reduced the dust concentration at pre-leg by 17.2% (Table 12). The percentage of reduction increased to 46.7% when the concentration was measured at the gallery. The most dramatic reduction was shown by the drop test (97.4%). The reduction of dust in the bin overspace was 70.9%. When the dust control system was on, the reduction in dust concentration at gallery, drop test, and bin overspace remained the same. However, the reduction in pre-leg dust concentration was by 42%. This observation is identical to that seen when water was added.

The dustiness of experimental lots of corn treated with mineral oil are described in Table 13; percentage reductions are given in Table 14. We observed the same reductions in dust emission when the corn was treated with soybean oil.

b. Particle size analysis

The air velocity at the surface of the Hi-Vol filters at the designated sampling rate was 25.6 cm/sec (28 cfm x 12 x 12 x 254)/(8 x 10 x 60), the terminal velocity of an 85μ diameter particle, the downward settling velocity of the particles, due to gravity, being greater than the upward capture air velocity. All the particle size analyses of the dust collected by Hi-Vol air samplers showed that less than 1% of the particles were larger than 85μ diameter. All the particle size analyses of the tailing dust collected showed that the total weight of particles greater than 125μ diameter exceeded 6.5%. The difference in quantity of large dust particles between Hi-Vol samples and tailing dust samples points out one difficulty in obtaining representative sampling inside enclosed equipment with Hi-Vol air samplers. The dust collecting system, with its large airflow rates and high air velocities, was designed to control and collect much larger dust particles than a Hi-Vol air sampler was designed to sample.

Representative results of the particle size analysis of Hi-Vol dust samples from corn in the enclosed belt are given in Table 15. When the dust control system was on, the diameter of dust particle collected by the Hi-Vol filter at the enclosed belt averaged 8.2μ compared to 12μ for similar tests with the dust control system off. We conclude from the data that the dust concentration measured by the Hi-Vol samplers in the enclosed belt were lower than the concentration would have been if higher airflow rates were maintained during the sampling. However, in most tests with the dust control system off, the Hi-Vol filter in the enclosed belt became loaded with dust before the test was completed. Those dust concentrations were representative of the first one-third to two-thirds of the test.

Results from the laboratory and pilot tests conducted at USGMRL showed that additives reduced significantly the amount of dust particles with

diameters less than 125u in diameter (Lai et al., 1981). There was a similar reduction in fine dust emissions in these tests. The particle size distribution of dust collected at the enclosed belt site (site B, Fig. 1) with the dust control system off are given in Table 16. The largest reduction of fine dust emission occurred in corn treated with mineral oil after 3 months of storage. The reduction may be due to the additional mixing as a result of extra handling of the grain from the storage bin through the bucket elevator and return to the bin. The 0.30% water treatment had a greater effect in reducing fine dust 15 seconds after application than did the application of either oil at any level tested. The treatment with vegetable oil appeared to have very little effect on any of the three grains at the enclosed belt site.

The particle size distribution for the dust collected from the open belt site (site C, Fig. 1) with the dust control system off is given in Fig. 17. The application of 0.30% water also significantly reduced the amount of fine dust collected. The additional mixing and tempering allowed both oil treatments to increase in benefit and equal that of water treatment at the open belt site.

The particle size distribution for dust collected inside the test bin (site E, Fig. 1) with dust control system off is given in Table 18. Every oil treatment at this site was more effective than at sites B and C as evidenced by the reduction in fine particle emission. In Table 16, the data show that corn treated with mineral oil continued to diminish in fine particle emission during the 3-month interval, but at site C (Table 17) and site E (Table 18) the improvement appeared to decrease during the second handling. Apparently the factors of aging and absorption had reduced the ability of mineral oil to contain fine dust.

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2. Wheat

Dustiness of control lots of wheat without additives are summarized in Table 19. The dust control system of the facility significantly affected the dust concentration at the pre-leg belt and gallery belt. The dustiness of the grain as measured by the drop test also appeared to be affected significantly by the dust control system and indicates that the dust control system removed substantial amounts of dust and fine material from the wheat, although the difference could also have been caused by variations in dustiness of different lots of grain. When soybean oil was applied to wheat, the reduction in dust concentration was similar to that of corn (Table 20). The differences in reduction due to varying oil concentrations (0.03 or 0.06%) were insignificant. Any additional mixing of the oil and wheat appeared to be less effective on wheat than on either soybeans or corn. Yet, we found that the use of 0.03% oil significantly and consistently reduced dust emission. However, when we tested grain dustiness, the grain samples treated with 0.06% oil were less dusty than those treated with 0.03% oil.

Three levels of soybean oil were added to wheat. They were 0.02, 0.03, and 0.06%. The percentage reduction in dust concentration at the pre-leg ranged from 21.3% to 63.3% (Table 21). The percentage reduction at the gallery ranged from 28.6% to 75.0%. The drop test consistently showed a 95.9% reduction of dust. A significant reduction of fine particle emission occurred at the test bin (Site E, Fig. 1), but took longer than either soybean or corn. This comparative delay for wheat compared to corn or soybeans could be related to the larger surface area for wheat. The reduction in bin overspace dustiness was 89.3% at 0.06% soybean oil when the dust control system was turned off. These percentages of reduction clearly indicate the value of oil treatments in reducing the concentration of dust that a control system must handle.

3. Soybeans

Dustiness of control lots of soybeans without additives are recorded in Table 22. The dust concentration in the bin overspace significantly increased whether the dust control system was turned on or off. However, drop tests showed that when the dust control system was off the dustiness of the grain was lower than when the system was on. The discrepancy may be due to the variation in dustiness between lots of soybeans or to the segregation of fine material into one lot. Table 23 gives the reduction in dust emission from the application of soybean oil to soybeans. The results are similar to those observed for wheat treated with soybean oil.

The percentage of reduction in dust concentration from the application of soybean oil to soybean is given in Table 24. Variations in grain lot dustiness may explain the dust reduction of only 1.8% when 0.03% soybean oil was employed. The percentage of dust reduction at gallery and bin overspace locations appeared to be consistent with those for corn and wheat.

E. Collected Tailing Dust

The amount of dust collected at four locations (work floor, garner, gallery floor, and D house) inside the facilities are summarized in Table 25. The dust saved (lb. dust from control lot minus lb. dust from treated lot) is also given. Without an additive, the dust collected by the dust control system was on the order of 400/5000/56 = 0.14%. In other words, the loss through the dust control system was approximately 0.14% each time grain was handled. When an additive was used, the loss was reduced to 0.035% or less. This observation means only one-fourth of the dust component of grain was dispersed when oils or water were added.

The effect of different additives and different levels of treatment on controlling the tailing dust collected by the dust control system at the work floor is given in Fig. 8. Apparently soybeans treated with vegetable

oil were hardly affected. Corn treated with soybean oil showed some effect at early mixing. Similar plots for the dust collected at the gallery floor, garner, and grain bin are given in Figs. 9, 10, and 11, respectively. The total dust collected is given in Fig. 12.

The particle size distribution of grain dust collected at the work floor after 2500 bushels of grain had been handled is given in Table 26. The total weight of dust collected from grain treated with water was greater than the weight of the dust collected without an additive, inferring that a substantial amount of water was probably in the dust. In our previous pilot test (Lai et al. 1979), the moisture content of dust treated with 0.5% water was found to range between 40 and 50%. Similarly, the dust collected at the garner per 2500 bushels of grain handled is given in Table 27. There was a substantial reduction in the fine dust collected. The data were consistent with the fact that during the test the observer was able to see the grain flowing for those cases when grain was treated with additives. The particle distribution of grain dust collected at gallery for handling 2500 bushels of grain is given in Table 28. Similarly, the dust collected in the enclosed bin space is given in Table 29. The trend is consistent with those at work floor.

There were large differences in the total amount of tailing dust collected on the first test and collected after the grain had been stored for 3 months both for the test lots and control lots (Table 25). The total weight of dust collected always increased according to the amount of water added during treatment, obviously due to high moisture content. After 3 months of storage, no dust was collected by the work floor dust control system. The oil-treated corn was handled first followed by the control test (without additive). Because both of these factors produce a significant margin of error, any results derived from data on the amount of tailing dust collected

by the dust control system should be interpreted with caution. Similarly, the errors due to inefficient by-pass alteration of the dust control system introduced during the collection of individual samples are difficult to assess.

F. Effect of Additive Treatment

We evaluated the effects of water and oil treatment separately, since the application levels for the two additives were quite different. In general, the treatment with water required an amount one order of magnitude greater than treatment with either mineral or deodorized soybean oil.

1. Water

Water effectively reduced dust emission at the pre-leg belt, especially when the level of treatment was 0.3% (Fig. 13). At the gallery floor, dust emission also was reduced significantly (Fig. 14). However, when the dust control system was off, the dust emission was less predictable. The dust concentration in the bin overspace was affected less significantly by the level of treatment, either with the dust control system on or off (Fig. 15). This observation was consistent with the readings from the drop tests (Fig. 16), which is predictable since in essence the measurement of dust concentration in the bin overspace is a large-scale drop test. Based on the correlation equation (Fig. 16), the effective level of water as an additive should be around 0.5%. However, no data were available to verify this prediction. Moreover, the effect of this level of treatment on the mold growth and insect infestation has not yet been studied. Based on the data of this experiment, it is safe to state that the application of 0.3% water would effectively reduce dust concentrations.

2. Oil

Treatment with mineral oil or deodorized soybean oil had little effect on reduction of dust emission at the enclosed belt site (Figs. 17-23).

At the pre-leg belt, either with the dust control system on or off, the level of oil treatment did not affect the dust concentration (Figs. 17 and 18), but after the grain entered the boot and passed through the bucket elevator, the resultant mixing produced a significant reduction in gallery dust concentration. From the data in Figs. 19 and 20, we conclude that the most effective level of oil treatment is approximately 0.03%. The data from bin overspace (Figs. 21 and 22) and drop tests (Fig. 23) support that conclusion.

G. Effects of 3 Months' Storage of Corn After Treatment with Mineral Oil

We combined lots of corn treated with 0.02 and 0.06% mineral oil into a single lot and stored the combined corn lots for 3 months. The average oil concentration was 0.04% since no additional oil was added after 3 months of storage. We also stored the control lot for 3 months and then made a total of 3 tests for the control lot and 4 tests for the corn treated with mineral oil (Table 21). Because the drop test instrument malfunctioned after 4 tests, we were not able to obtain data for the last 3 runs with the dust control system off. The data shown in Table 30 clearly indicate that the effect of storage in diminishing dust control was insignificant. In fact, because of the extra mixing action of handling, the dust emission was much lower after storage. But, in this case as in all the tests, it is difficult to access just how much of the differences observed in the results are due to variations in equipment, individual operators, and grain lots.

IV. CONCLUSIONS

1. Water applied at a level of 0.3% to corn reduced the dust concentration by at least 80% on the gallery floor. At the same location soybean oil or mineral oil applied at a level of 0.05% reduced dust by more than 90%.

2. Water had the most effect at the pre-leg site shortly after application but was less effective at the gallery and bin overspace. The situation was reversed for oil treatments.

3. The effectiveness of mineral oil as a dust controlling additive was not reduced after grain had been stored for 3 months.

4. Thorough mixing of the grain following the application of an additive is one of the most critical elements in the success of controlling dust. The treatment should be applied at an early stage of grain flow from a bin. The modifications required for effective application in existing installations are minimal.

5. Little oil accumulated on the equipment or the walls. This was due to proper mixing and to the low treatment level (<0.06%).

6. Board of Appeals did not consistently detect the presence of soybean oil or mineral oil on corn or wheat.

7. The dustiness index developed in this work to measure the dustiness of grain consistently correlated with other methods of dust measurement.

8. There were no variations made in the degree of mixing in the tests, and thus no conclusions can be made concerning the amount of mixing necessary to achieve optimal results.

RECOMMENDATIONS

1. Additional research focusing on the feasibility of an oil-water additive treatment would be beneficial (e.g. 90% water and 10% oil at a treatment level of 0.3%).

2. The dust collected from grain treated with an additive contains some of the additive. The explosibility characteristics of such dust should be determined.

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STATEMENT OF JON A. JACOBSON, VICE PRESIDENT OF MARKETING, PEAVEY COMPANY, MINNEAPOLIS, MN

Mr. Chairman, my name is Jon Jacobson and I am Vice President of Marketing for Peavey Company, a subsidiary of ConAgra, Inc. As an operator of 90 grain elevators in the United States handling nearly a billion bushels of grain each year to domestic and export customers, Peavey Company is firmly committed to ensuring both the quality of its grain and the safety of its many employees. To this end, Peavey utilizes a water-based grain dust control system presently in 12 of its elevator facilities. The system has been remarkably successful in protecting workers and communities from the potentially serious hazards of elevator grain dust.

A recent media report on the potential for economic abuse of water-based dust systems has spurred USDA publication of a proposed ban on all such practices. While intending to eliminate isolated abuse, the only certainty of this proposed rule would be the elimination of the legitimate practice. Such an action would clearly eliminate, according to USDA scientists, one of the most effective safety technologies available to this potentially dangerous industry.

Mr. Chairman, water-based dust suppression simply offers too much in the way of industry safety progress to be hastily dismantled without first examining all other means to eliminate potential economic abuse. Rational regulation by USDA is the alternative.

THE NEED TO CONTROL GRAIN DUST

While grain may seem like an innocuous commodity to casual observers, its dust, when sufficiently high in concentration and low in moisture, can become an extremely dangerous substance when rapidly transferred through elevators. In 1977 alone, there were 10 grain elevator dust explosions in the United States, which resulted in the loss of 59 lives. Knowledgeable scientists specializing in the study of grain dust, believe such explosions are cyclical in nature. The industry continues to have periodic explosions and fires which remind us of our ongoing need for progress in elevator safety.

While the danger of grain dust is primarily associated with the potential for fire and explosions at points of grain transfers, insufficient grain dust suppression inside elevators is also believed by the Occupational Safety and Health Administration (OSHA) to be the cause of lung disease in previous generations of grain elevator operators.

Grain dust emissions are considered by the Environmental Protection Agency (EPA) to be a potential environmental hazard. If not carefully controlled, dust will cause pollution of the environment surrounding grain elevators. This is an area of increased action by the EPA as clearly illustrated by the Clean Air Act Amendments of 1990, which will reduce permissible emissions at U.S. elevators beginning in 1994/1995. An overview of the impact of this act on grain handling operations by one of the leading U.S. grain dust experts is attached and I ask that it be presented as part of my statement. [3]

WATER-BASED DUST SUPPRESSION—A BRIEF HISTORY

Mr. Chairman, in 1978, in the aftermath of several devastating grain elevator explosions, the U.S. grain industry embarked upon a thorough series of research projects to determine both the causes of grain elevator fires and explosions and possible means for prevention of such calamities. The conclusions reached in the 36 industry-funded studies pointed to grain dust as the primary fuel of these explosions and endorsed the use of liquid additives as a promising method for improved control of ambient dust by U.S. grain elevators. One of these reports, "Examining the Use of Additives to Control Grain Dust" was published by USDA Agricultural Research Service scientists in 1982 and formed the basis of Peavey Company's current water-based dust suppression safety system.

Water-based dust suppression was endorsed by the USDA Federal Grain Inspection Service (FGIS) when it issued a 1987 rule recognizing the application of additives for dust control purposes and, thereby, eliminating potentially explosive concentrations of dust. Water-based systems have also subsequently been recognized by the FDA, OSHA, and EPA as a legitimate dust control practice from each of their diverse perspectives.

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[3] See pp. 100–101.

WATER-BASED DUST SUPPRESSION—A PERFECT SAFETY RECORD

Peavey began using water-based systems in 1983. Since then, there have been no explosions, deaths or injuries at any Peavey elevator using a water-based system.

Throughout the industry, however, explosions, deaths and injuries persist in elevators not equipped with water-based systems. Since 1983, the FGIS reports that U.S. grain dust explosions and fires have resulted in 27 fatalities and 132 injuries.

Grain elevator dust explosions have taken place as recently as June 1993.

WATER-BASED VS. ALTERNATIVES

Peavey Company uses all three primary forms of dust control: pneumatic suction, water, and oil, depending on elevator design and end-use grain requirements. The methods are often integrated for optimum performance. As a result, we are well aware of the strengths and weaknesses of all three techniques.

Pneumatic Systems

Pneumatic suction systems, while generally effective at controlling grain dust, possess significant shortcomings. A pneumatic system is essentially a gigantic vacuum cleaner connected to various points of the elevator known to have dangerous dust concentrations.

In addition to being extremely expensive to install, such complex systems are difficult to properly maintain, and consume a great deal of electricity. Such systems are often the focal point of elevator explosions. While pneumatic systems effectively remove dust, many elevators subsequently recombine that dust with the grain to avoid any weight loss. Dust that is not recombined creates its own handling and storage hazards.

Oil Additives

Oil additives, either mineral oil or vegetable oil, are also a recognized dust control technique. This practice, like water-based dust suppression, was created by USDA scientists. A 1982 USDA study on additives found that while both water and oil applications result in significant dust reductions, oil application is very slow to develop dust control as it requires extensive mixing in the grain flow. As a result, the impact of oil dust control is negligible at the most explosive and critical location of the grain elevator transfer process: the elevator legs.

Oil can also negatively impact the quality of some types of grain and its end-use applications in its processed stage. A number of U.S. flour millers, both large and small, prohibit the use of oil dust suppressants on the wheat they buy. One of the largest U.S. baking companies stipulates in their contract terms that no oil is to be added to the wheat from which their flour is milled. A major U.S. brewing company has a nearly identical contract term, that no oil is to be added to the malting barley which they buy. Each of these domestic buyers of grain, and its products, has identified negative impacts of oil additives on end-use quality.

A second concern with oil additives, either mineral or vegetable based varieties, is the potential residual buildup through repeated additions in the grain distribution channel. While natural water utilization evaporates and moisture is routinely monitored, oil additives remain with the grain and go unmonitored in standard grain analysis.

The FDA has regulated the maximum amount of mineral oil which can be added to grain. The second application will clearly place the handler in violation of FDA limits. Again, oil is not a full or equal substitute for water-based dust suppression.

Water Additives

The greatest strength of water-based dust control is its proven ability to immediately suppress dust at grain elevator legs, as shown in USDA testing. It bears repeating, the elevator legs contain the greatest concentration of suspended grain dust during routine operation. Virtually all grain dust explosions are chain-type reactions triggered by primary explosions at elevator legs.

Water addition at the leg dramatically reduces the fine dust particles and increases the moisture content of the dust, thereby lessening the grain dust's explosibility. Additionally, water addition decreases electrostatic activity within the leg, reducing ignition source volatility. Clearly, water-based dust suppression is the superior safety practice at this critical point.

Peavey's insurance underwriters agree that water-based systems, when utilized in combination with pneumatic suction systems, present the safest approach to controlling dangerous air suspension and accumulations of grain dust.

In the absence of a legislative prohibition of the practice, we will enthusiastically continue water-based dust systems for the safety of our employees and facilities. The

system has evolved through several generations since its USDA creation. We intend to continue to innovate refinements.

CURRENT INNOVATION

The latest generation of water-based dust suppression systems is currently in the final developmental stages at our Council Bluffs, Iowa, grain elevator. In addition to the computerized control systems we have in place at other locations, we have introduced high pressure atomizing nozzle hardware. The objective is simple—to continue our progress on maximizing dust suppression, while simultaneously reducing the amount of water required. The preliminary results in meeting this dual objective are highly impressive. As a result of this type of technological progress, this would be especially poor timing for prohibition.

SCIENTIFIC LIMIT SHOULD BE ESTABLISHED:

While FGIS and FDA recognized this safety practice long ago, neither has ever established a numerical limit on the practice. We believe water utilization to grain should be regulated through the establishment of strict limits and strict enforcement of such limits.

—FDA has set a maximum on the amount of mineral oil additives which can be added to grain for dust control.
—EPA has set limits on fumigants, pesticides and fungicides that may be added to grain.

There is strong precedent in the industry for FDA and USDA to set limits on permissible water addition for dust control.

PRODUCER'S ASPECTS

Such elevator cost considerations are of rising significance in the eyes of U.S. grain producers. While minor operating cost increases at their local elevator are normally absorbed, major cost increases are consistently passed back to farmers in the form of lower prices for their grain. As a result, progressive producer groups are generally in favor of water-based systems, as being both cost effective, suited to end-use characteristics, and environmentally sustainable. Their membership recognizes the value of maintaining a maximum number of buying elevators in the delivery area.

QUALITY ASPECTS—NO INTERNATIONAL COMPLAINTS

There is no scientific research to our knowledge which concludes that the water addition amounts utilized in USDA/ARS research damage the quality or storageability of grain or oilseeds. Research findings by USDA scientists have shown no resulting quality deterioration in water spray treated corn stored for one year. Additionally, it is important to look at actual experience. Properly controlled water-based dust suppression, in practice at our export elevators, has not resulted in a single related complaint. If objective science had conclusively demonstrated a negative grain quality effect, please be assured Peavey would have never begun the practice.

MARKETING ASPECTS

The rule-making activity of FGIS over the last year on water utilization has resulted in increased questions from buyers which Peavey has openly addressed. While buyers in general may ideally prefer no additives for any control measure, including pesticides and fumigants, they have not been opposed to computer-controlled water utilization at our elevators.

A limited number of independent grain buyers currently specify "no water" is to be added. It is important to recognize, however, that a much greater number specify "no oils" be added. The FGIS Certification Rule earlier this year communicates to the foreign buyer when water has been added for dust suppressant purposes, while such certification is silent on any oil additive addition.

ECONOMIC ASPECTS

Water utilization does have a minimal impact on the weight of the grain, as recognized in the USDA/ARS research of 1982. All grain shipments contain a weight component in the form of moisture, introduced to grain and to grain products through a broad variety of common practices. Moisture content is intentionally raised by sophisticated aeration systems and outdoor grain storage, while uninten-

tionally raised by routine river barge transportation of corn and soybeans to New Orleans.

It is important to recognize, however, that moisture is measured at every transaction level in the commercial chain: from farmer to handler, from handler to domestic processor or exporter, and from exporter to foreign buyer. The moisture weight, as a percentage of grain, is a visible part of every commercial transaction.

Peavey Company elevators carefully control the amount of water added and the company's written policy is to use water exclusively as a means for dust prevention. The company currently takes every possible step to ensure the proper use of water, including the use of computer-controlled systems that keep water application below the self-imposed USDA Agricultural Research Service demonstrated effective levels for the safe reduction of grain dust. Through experimentation with new technology we continue our efforts to maintain effective dust control while decreasing the water requirements.

PEAVEY REGULATORY PROPOSALS

Several months ago, Peavey responded to concerns of the Federal Grain Inspection Service (FGIS) that some grain handlers may potentially abuse the use of water. Peavey submitted two separate regulatory proposals to the USDA which would eliminate any such abuse.

First, Peavey proposed the implementation of a strict user fee funded permit system, in tandem with the use of tamper-proof computerized controls on water-based techniques, to assure the proper use of water.

Currently, the CCC examiners inspect grain warehouses twice per year. During those inspections, the CCC examiners do an audit of the elevators for grain quantity and quality by commodity. They also ensure that recording procedures are in accordance with their requirements including scale tickets, contracts, warehouse receipts, daily position records, farmer payments, and inventory records and adjustments. All bins are measured and graded. It would be both logical and simple for the CCC examiners to include a verification that a certified dust suppression system is being used in accordance with USDA procedures and that records are complete. It could also be profitable for the CCC and there is precedent for this. On at least one occasion, the OIG has used the CCC to measure inbound versus outbound moisture.

Second, Peavey supported pricing grain at its dry weight on an industrywide basis. This proposal has been advanced in the past by both U.S. producer and academic circles, in an effort to perfect the marketplace incentives to growers. This market approach would also address and reduce the currently uncontrolled practice of blending broad ranges of grain moisture, while improving the U.S. grain quality available to both domestic and export channels. The company plans pilot testing of dry-weight pricing shortly.

CONCLUSION

Water-based dust suppression integrated with other dust control methods is the most effective means of protecting grain elevator workers and their communities from potential explosions, the risk of long-term health problems and environmental pollution. If the eventual decision by the USDA were to ban water-based systems, the long-term safety of employees and local communities would be compromised.

Oil additive systems do not offer a fully suitable replacement due to their impact on quality. Pneumatic systems, on their own, do not offer a fully suitable replacement and are cost prohibitive to medium and small elevator companies.

Feasible regulatory actions to eliminate the potential for economic abuse clearly do exist. Just as elevator weight scales were automated and made tamper-proof several years ago, water-based systems can follow the same pattern. Peavey looks forward to assisting the USDA and the industry in developing a regulatory solution which will continue the superior protection offered by water-based dust suppression.

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ENVIRONMENTAL ISSUES FORUM:
IMPACT OF THE FEDERAL CLEAN AIR ACT ON GRAIN HANDLING OPERATIONS

Calvin B. Parnell Jr., P.E.

Calvin B. Parnell is professor of agriculture engineering at Texas A & M University, College Station, TX. His teaching and research interests include processing, drying, systems engineering, air pollution and grain explosions.

Presentation Outline

- The Federal Clean Air Act (FCAA) is the most profound environmental legislation ever passed by the Congress.
- Figure 1 illustrates the relationship of state and federal governmental bodies in implementing the FCAA.
- Figure 2 outlines USEPA responsibilities and functions.
- All air pollution regulatory activities will be funded through fees on "major sources."
- All grain elevators subject to New Source Performance Standards (NSPS) are major sources.
- The air pollution regulatory agency in Texas will grow from 400 personnel, $16M (1990) to 1,300 personnel and $80M (1995). Other states will have similar growth.
- All State Implementation Plans (SIPs) must be submitted to USEPA by November 1993. Based on the SIPs, USEPA will decide whether the state will be delegated authority to implement the FCAA. If the state is not delegated authority by USEPA, USEPA will regulate air pollution in your state.
- Interpreting "intent of Congress" by USEPA can be controversial and must have proactive input from agricultural groups.
- Each state air pollution regulatory agency will expand — with more rules and regulations, more enforcement people and additional permitting responsibilities.
- Since the funding for these regulatory activities will be derived solely from fees, elected state officials will have little or no control of this expansion.
- The expansion will be controlled by USEPA's interpretation of the "intent of Congress" in the FCAA and USEPA's guidance to state agencies. State agencies must respond to USEPA's direction and must demonstrate to USEPA that they have the necessary resources and enabling legislation to properly implement this act.
- The power associated with environmental legislation such as the FCAA is not the "growth" of budgets and personnel. It is the attitude of the "public." We have people complaining about odors and dust and perceived dangers from toxics, hazardous waste incinerators, etc., who were not involved with these issues a few years ago. These people know where to lodge their complaints.
- There are a few "characters" in agriculture who view expenditures on air pollution abatement systems as a waste of money and have an attitude that "no regulator can tell me what to do."
- Very few agricultural operations can afford to pay large fines and annual emission fees and continue operating. A cotton ginner, cattle feeder or grain elevator operator has no control over the market price of the agricultural product and, as such, cannot pass the cost on to consumers as many other industries can.
- The public will not allow the regulators to offer "special" treatment for agricultural operations.
- The cost of properly engineered and installed air pollution abatement systems is significant, and very few resources have been invested by USDA, USEPA and other funding sources into researching and developing economical and effective air pollution abatement systems for agricultural operations.
- The FCAA has resulted in major changes in the way air pollution is and will be regulated. It has resulted in giving EPA and state agencies much more power than they had before. It is likely that the Federal Clean Water Act (FCWA) amendments that were supposed to have been passed by the Congress over a year ago will be passed this coming year. It is my understanding that this legislation is similar to the FCAA amendments. If this is true, there could be a similar expansion and increased power to state water pollution control agencies.

- One of the most frustrating aspects of air pollution regulations affecting agricultural operations is that violations are almost always "nuisance" violations, and the determination of whether a violation has occurred seems to be "subjective." The "subjectivity" associated with enforcement must be minimized, and this can only be accomplished through quality research. It is expensive.

What should the agricultural community do in response to new rules and regulations, more enforcement personnel and the increasing cost of complying with environmental regulations? We could take the "ostrich approach" and bury our heads in the sand until the regulators kicked us in the behind. We could take the "fighter's" approach and attempt to demonstrate through political and legal means that regulators "can't tell us what to do."

An alternative would be to work with the regulators with the goal of "fair" implementation of the FCAA. To do this, we must have capable technical people representing agricultural interest. We must strive to have our inputs to the regulatory process be based on science, engineering and economics, and not on emotion. We must be involved and informed. We must be proactive, not reactive. We must fight those issues that are clearly "unfair" with scientific responses and win!

There are some that may need to budget resources to get into compliance with environmental regulations before the regulator shows up. We need to be good neighbors and work with them to demonstrate that we are striving to reduce air pollution problems. We must be involved!

STATEMENT OF DAVID ARIAN, PRESIDENT, INTERNATIONAL LONGSHOREMEN'S AND WAREHOUSEMEN'S UNION

I am David Arian, President of the International Longshoremen's and Warehousemen's Union, headquartered in San Francisco, California. The ILWU represents 50,000 workers on the west coast, including Alaska, Canada, and Hawaii, who are employed on the docks, in warehouses, and in manufacturing and transportation industries.

Among those members represented by the ILWU are approximately 500 workers who are directly employed in the grain industry, both in dockside and shoreside operations at 9 export facilities on the west coast centered in the Columbia River region of Washington and Oregon. At the Peavey grain elevator (owned by ConAgra) in Kalama, Washington, cited as 1 of 3 export elevators in the Nation where grain is watered, we represent several longshoremen working on dockside operations and 27 employees engaged in shoreside operations.

We support the proposed ban on grain watering contained within the legislation under consideration by Congress, and in the regulations proposed by the Federal Grain Inspection Service. We support the ban for the following reasons:

1. The detrimental effect of watering on grain quality, including the promotion of mold, microbial contaminants, insects and rodents, and on the reputation of all U.S. grain.
2. The negative effect on overseas markets if buyers feel they are being cheated by exporters surreptitiously adding water to increase profits.
3. The unfair advantage gained by one company adding water to grain to increase its profits, which may encourage other companies to adopt similar unscrupulous practices to remain competitive. If water was added to the maximum levels, it would increase the price of 1 year's domestic corn crop by $45 million, and the soybean crop by $40 million, none of which will be distributed among the farmers and workers who grow and move the grain, but would be diverted to the large exporting corporations.
4. Alternatives to watering exist that have proven safe and effective in controlling grain dust without gouging buyers, damaging grain quality or shrinking markets.

The loss of markets will eventually be felt on American shores as the demand for farmers' production decreases, prices fall and fewer workers are needed to move the grain by rail, barge, in elevators and on docks.

Before I explain our support for the ban in more detail, I would like to address the issue of safety, which is vitally important to the ILWU and our members. The ILWU, along with the other labor unions, has long fought for standards that will make our workplaces safer and healthier. We have supported the efforts to improve health and safety in the grain industry through the use of vacuum systems, better elevator design, improved training, slower loading, dust control suppression, and tougher regulations and enforcement by the U.S. Occupational Health and Safety Administration (OSHA).

We favor any reasonable method to improve the health and safety of the workplace, and support the continued use and development of dust suppression systems. We also support the use of mineral oil, when necessary and possible, as a secondary dust control method to improve working conditions and prevent deterioration of the surrounding environment.

However, it has become increasingly clear that current grain watering practices are not designed to improve health and safety conditions at elevators, but to increase profits at the expense of buyers, and ultimately at the expense of the American workers and farmers. It has never been shown that it is necessary to use water instead of other means to control dust for health, safety or environmental reasons. ConAgra's main defense seems to be only that other dust control methods are *more expensive*, not less effective, safer or better for the grain. In fact, ConAgra explicitly acknowledges that pneumatic systems are effective.

What has been demonstrated is that companies like ConAgra can generate additional profits of up to $50,000 per shipment by adding a mere one half of one percent of water weight to a 50,000 metric ton vessel. At Peavey/ConAgra's Kalama elevator, buyers pay for the additional water added to the grain, as well as a dust control charge of $21,000 per Panamax vessel for the pneumatic system, for annual revenues of $2.17 million.

The examples of grain watering uncovered in the USDA investigation, such as spraying grain with fire hoses; continuously adding water until the grain reaches the maximum moisture level allowed by law; and applying water at the wrong loca-

tions for dust control, with improper equipment and at excessive rates, clearly show the intent of the practice is profit rather than safety.

A Wall Street Journal article (July 1, 1993) stated that trading firms in Japan, the largest buyer of U.S. crops, "discreetly called Washington's attention to the [grain watering] practice." The same article quoted a Tyson Foods executive as saying the company refuses to deal with anyone who waters grain. Another article quoted a Japanese wheat buyer telling Canadian producers that they preferred Canadian grain over that of the United States (Billings [Montana] Gazette, August 15, 1993). Grain watering dilutes one of the major advantages that U.S. wheat enjoys—relatively low moisture content—compared to competing export countries, such as Canada and France.

The use of water is opposed by the European Community Seed Crushers and Oil Processors Federation, the Director of the Japan Oilseed Processors Association, and the Mielieraad Maize Board—a South African corn importer that told the FGIS it would no longer purchase corn from U.S. export ports where water is added. Many other U.S. companies have also apparently asked the FGIS to prohibit the addition of water to grain. The American Soybean Association supports a ban on water.

The halt in exports to South Africa directly hurts American workers like our members in Kalama, Washington, where corn is a major export from the Peavey/ ConAgra elevator. Recent articles in the Wall Street Journal and The Journal of Commerce & Commercial have explored the issues involved in declining grain exports, and the reduction in work for American workers. With a multitude of factors working against U.S. exports, we can ill afford to hammer another nail in the coffin by appearing to cheat buyers.

The National Farmers Union, a nationwide organization representing 200,000 members, opposes adulteration of grain.

"If you start pouring water on grain, you hurt the quality," said Jeff Kirkpatrick of the Nebraska Farmers Union. "If you hurt the quality, you make it harder to export. It hurts our markets. That's one of the problems we have already: We don't measure up to the quality of grain produced by other exporting countries."

Allen Richard, of the National Farmers Union in Washington, DC, said: "As a matter of principle, we feel it [grain watering] is borderline illegal. We've long felt that any kind of adulteration of grain gives farmers a black eye. Watering is just plain wrong."

Other measures besides a total ban on water have been suggested by some, including, not surprisingly, ConAgra, the largest user of water. However, it has been demonstrated by the FGIS and others the difficulty and expense in enforcement of these alternative means, and the opposite effect they might ultimately have by encouraging other companies to use water.

We feel that the present alternatives are better solutions. One study has determined that soybean or mineral oil applied at minute levels, far less than that required with water applications, reduced dust by more than 90 percent for long periods of time.

We are pleased to see that ConAgra has become a recent convert to the issues of health and safety, and the necessity to control grain watering. However, it appears that ConAgra came forward only *after* it was caught. Now it wants to be first in line to offer suggestions on how to control a practice it could have voluntarily controlled years ago, and is still intent on preserving the benefits of grain watering for itself.

STATEMENT OF BARRY J. JACOBSEN, DIRECTOR, MONTANA AGRICULTURAL EXPERIMENT STATION, MONTANA STATE UNIVERSITY

Dust control during handling of grain is critical to prevent dust explosions and to protect workers' health.

The application of water to grain to suppress dust is unlikely to increase mold damage if grain moistures are below critical levels, if the additional water does not increase grain moisture (equilibrium relative humidity) above critical levels, and humidity is such that free water does not remain on grain for long periods (hours). Water added for dust control is not different in terms of affecting mold growth from intrinsic moisture.

The critical moisture levels above which mold growth occurs for starchy cereal grains is approximately 13-14% (or the moisture that is in equilibrium with 65-70% relative humidity). At moistures below this level, fungi (molds) which decay cereal seeds cannot grow. Grain decaying fungi will grow rapidly at moistures above 14-15% (70-75% relative humidity); therefore, the addition of water will not induce mold growth so long as the grain moisture plus additional water does not reach

levels above 13–14%. The amount of water used for dust suppression generally causes insignificant increases in grain moisture. For example, a 60 lb. bushel of wheat would require 0.6 lb. of water (9.6 ounces) to raise moisture 1.0%. Typically, water is applied at less than one-tenth to one-twentieth of this rate and moisture changes are minor. However, if grain moistures were at or near critical thresholds, the addition of water could induce infection by grain-deteriorating fungi.

There is, however, a critical concept to understand: When grain moistures are determined they are average for a mass of grain. Individual seeds may have higher or lower moistures than the average for a mass of grain (individual seed moistures often vary by 1–2 percent). Once grain-deteriorating molds begin to grow, they produce water, heat and carbon dioxide as byproducts of their metabolism. Thus, raising moisture above a critical level in only a few seeds can result in long-term decay of the entire grain mass.

The safety of water application for dust control is determined by the highest moisture seeds in the grain mass, not the average moisture and the ambient temperature of the grain. Therefore, unless the range of moisture in individual seeds can be determined, the use of water for dust control could negatively affect marketability. Figure 24 below illustrates the interaction of grain moisture and temperature.

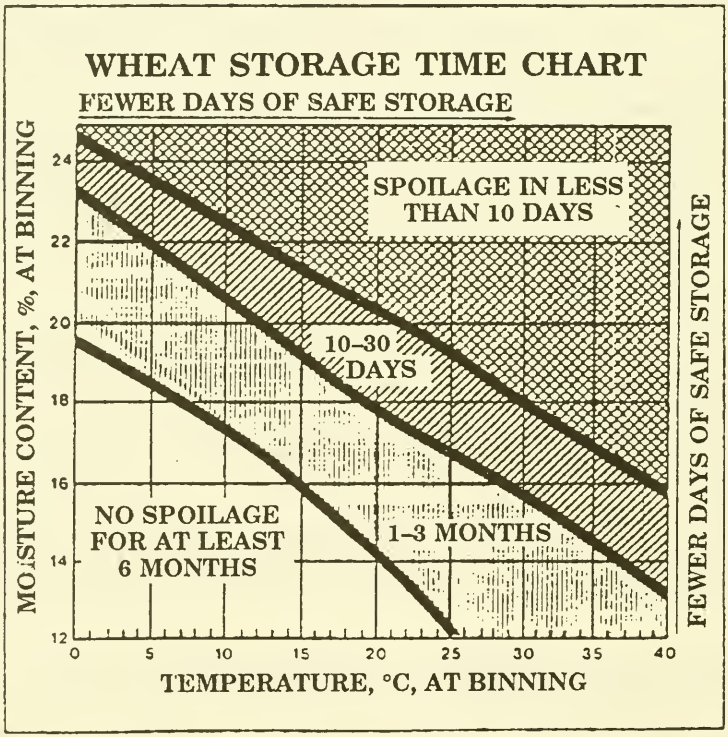

Figure 24. Wheat storage time chart showing zones in which spoilage occurs in less than 10 days, within 10–30 days, within 1–3 months, and no spoilage for at least 6 months (Wilkins, 1983).

Because of rapid evaporation at the seed surface and the relatively slow absorption of water by seeds, one cannot assume added water will directly affect grain moisture by the amount of water added. The rate of evaporation is determined by the relative humidity and absorption is determined by temperature and seed type. Thus, there is no simple moisture threshold for water application for which there will be no adverse effects; however, the rates of water applications commonly used for dust suppression are unlikely to cause mold problems with most grain lots. There is a critical need for research in this area if application of water to grain lots is allowed.

The repeated application of water over time is not different than a single application. The critical issue is the ultimate moisture of the wettest (highest moisture)

seeds in the grain mass. A critical question requiring research is the influence of repeated water applications on processing characteristics (e.g., "falling numbers" on bread wheats).

The question of developing forensic evidence in regard to the contribution of dust control water is difficult. One could determine the effect of the added water if accurate moisture records were available and the volume of added water known. The amount of water added could be approximated if adequate moisture records were available; however, one must remember, it is the highest moisture seeds in a lot that determine mold activity.

There are other available technologies for dust control. These include the use of mineral or vegetable oils at rates of 0.2–0.6 fl oz/bu or the use of mechanical dust control devices. The oil option is more expensive than water, but limited research indicates that applied mineral or vegetable oils suppress mold activity and growth. Dr. Donald G. White at the University of Illinois has an extensive data base on use of oils. The cost of oil varies by the type and purity of oils selected; however, they are an economically viable option. Oils can be used on oil seeds such as soybean or canola without causing damage (loosened seed coats) such as that caused by water.

The use of mechanical dust control devices also has associated costs. These include installation, maintenance and power. If dust is not added back to the grain, the loss of weight is also an additional cost. Mechanical dust control can be used for all seeds.

While water can be an effective dust suppressant on cereal grains, it can be misused. As long as grain is not traded as a dry weight bushel, there will be incentives to add water weight to dry grain up to the limit accepted in commercial trade. The addition of these levels of water can cause mold and should not be allowed. If grain were traded as a dry weight measure, there would be no incentive to misuse water.

STATEMENT OF THE NATIONAL GRAIN AND FEED ASSOCIATION, WASHINGTON, DC

The National Grain and Feed Association (NGFA) appreciates this opportunity to present our views on legislation prohibiting the addition of water to grain.

The NGFA is the national nonprofit trade association of 1,100 grain, feed and processing firms comprising 5,000 facilities that store, handle, merchandise, mill, process and export more than two-thirds of all U.S. grains and oilseeds utilized in domestic and export markets. NGFA member firms comprise the largest sector of U.S. agribusiness.

I. LEGISLATIVE PROHIBITION ON THE ADDITION OF WATER TO GRAIN

In a letter dated December 14, 1993, NGFA asked the Administrator of the Federal Grain Inspection Service (FGIS) to immediately "* * * ban the addition of water to grain with the exception of, for example, pesticides and dyes and when part of a contract." The letter is attached. As we stated at the time, this was not a request for a total ban since there may be other exceptions to a total ban beyond the ones previously noted.

In the August 4, 1993 Federal Register, FGIS proposed a prohibition on the addition of water to grain except when used in milling, malting and similar processing operations. Comments are due by December 3, 1993. NGFA compliments FGIS for taking this action and looks forward to submitting comments to the agency on its proposed ban. In our view, this is a complex issue and we believe the regulatory approach is best in this situation because it allows consideration of a full range of views on the pros and cons of the proposal before arriving at a final regulation. We think this approach has the best chance of yielding a rule that protects grain quality and will minimize the potential for abuse without unduly hampering transactions satisfactory to both buyer and seller.

II. PROVISION THAT ALL OFFICIAL CERTIFICATES REPORT THE NET WEIGHT OF SOUND WHOLE GRAIN AT A STANDARDIZED MOISTURE LEVEL

It has been suggested that official certificates report the net weight of sound whole grain at a standardized moisture level as a way to eliminate any market incentive to add moisture to grain. We have serious reservations about this approach for several reasons. First, it is not clear to us that this approach would achieve the elimination of any market incentive to add water to grain. Specifically, the standardized bushel concept would not eliminate the incentive of those who overdried grain to add moisture back to match the standard moisture level. Second, we fear the use of the standardized moisture concept in addition to any contractual mois-

ture levels will be confusing and potentially disruptive to both domestic and export markets. Lastly, we are concerned that the quality of some grain may be severely affected by the use of a standardized moisture level if it does not provide some penalty for overdrying grain. Currently, grain delivered with moisture levels significantly above or below that desired by the market will suffer economic penalties commensurate with the difference between the moisture level actually delivered and the moisture level contained in the contract. This system of weight and price discounts has been developed over many years and has proven to be an efficient way to inform market participants about what moisture levels are desirable from a storage, handling and processing viewpoint. A standardized moisture level may disrupt that signalling process and could be inappropriate in some market years due to unusual market conditions.

LETTER OF THE NATIONAL GRAIN AND FEED ASSOCIATION

NATIONAL GRAIN AND FEED ASSOCIATION,
WASHINGTON, DC, *December 14, 1992.*

Mr. JOHN FOLTZ,
Administrator, Federal Grain Inspection Service, Washington, DC 20090-6454.

DEAR MR. FOLTZ: Beyond the Food and Drug Administration's prohibition on adding water to grain for the purpose of adding weight, the question of what constitutes acceptable situations where water may be added to grain has been ongoing and controversial. While supporting responsible and necessary uses of water (e.g., using water as a carrier for a pesticide), NGFA has consistently opposed practices that add water to grain for the purpose of adding weight.

Recently, concerns have been raised about the practice of using water to suppress dust in grain exported from the United States. In an attempt to address this practice, the Federal Grain Inspection Service proposed a rule for **Certification of Additive-Treated Grain** for public comment. In NGFA's written comments, we recommended that the agency withdraw the proposed rule and expedite the agency's next proposed rulemaking to "* * * control or prohibit additives, especially water, that will address all grain handling establishments."

Since submission of our written comments on the proposed rule, NGFA leadership has been engaged in extensive internal discussions about possible follow-up action by the association to address this topic. At its September meeting, NGFA's Board of Directors requested NGFA's Grain and Feed Safety, Quality, Grades and Weights Committee to meet at its earliest convenience to discuss the issue further and make a recommendation to the Board of Directors on possible NGFA followup action by the association to address this topic. At its September meeting, NGFA's Board of Directors requested NGFA's Grain and Feed Safety, Quality, Grades and Weights Committee to meet at its earliest convenience to discuss the issue further and make a recommendation to the Board of Directors on possible NGFA followup action.

The committee met and the Board of Directors approved the committee's recommendation that "NGFA go to FGIS asking for an immediate ban on the addition of water to grain with the exception of, for example, pesticides and dyes and when part of a contract." Please consider this letter a formal request from NGFA for FGIS to take such action.

As the statement implies, this is *not* a request for a total ban on the addition of water to grain. Some examples of possible exceptions to a total ban are noted and there may be other acceptable exceptions. Lastly, this request is not directed at regulating the necessary uses of water in processing operations that transform grain into feed or food products.

The National Grain and Feed Association looks forward to working with the Federal Grain Inspection Service to resolve this controversial issue. Be assured that our industry remains committed to ensuring that U.S. grain continues to provide, in reality and perception, the high quality grain the market demands.

If you have any questions about this letter, please feel free to call me at (217) 465-5331.

Sincerely,

(Signed) JAMES BUCHANAN,
Chairman, Grain and Feed Safety, Quality, Grades and Weights Committee.

LETTER OF WALKER AND ASSOCIATES

WALKER & ASSOCIATES,
SPRINGFIELD, MISSOURI, *September 9, 1993.*

Hon. TOM DASCHLE,
Chairman, Subcommittee on Agricultural Research, Conservation, Forestry, and General Legislation, U.S. Senate, Washington, DC 20510.

DEAR MR. CHAIRMAN: Although I had hoped to be permitted to appear before the committee as a witness in favor of the continued use of water as a dust suppressant in the grain industry, your willingness to accept my written comments is deeply appreciated.

Walker and Associates is a professional consulting group specializing in identifying, analyzing, and cost-efficiency solving problems in property risk control, fire life-safety, fire protection systems review, general and public liability risk control, and occupational safety and health. We visualize these areas as encompassing all aspects of the protection of assets—human, financial, and material—from loss.

My comments will be limited to fire and explosion implications, employee health, and the financial impact of a legislative ban on the legitimate practice of using water for dust suppression.

FGIS has taken the position that there are alternative dust control methods available and in use throughout the industry. One of these alternatives, pneumatic systems, although installed in export, terminal and the larger country elevators, are either not provided or are substandard and ineffective in hundreds (possibly thousands) of the smaller country elevators.

Water-based dust suppression systems are installed in facilities having pneumatic systems (as FGIS indicates in their reasoning for the abolition of water), but our experience in surveying grain elevators for property insurance purposes reflects that the water systems were installed in the majority of cases because the pneumatic systems have a long history of generally unsatisfactory performance and are expensive to operate and maintain.

The FGIS proposed rule states "prohibiting water as a dust control method will not increase the risk of elevator explosions nor have a significant economic impact on elevators that currently use water." We take exception to this statement. Water is considerably more effective in the bucket elevator leg, the number one cause of explosions.

OSHA, National Fire Protection Association, and others have requirements that include limiting fugitive dust layers to one-eighth inch deep in priority housekeeping areas of grain elevators. We rarely find a pneumatic dust collection system that can maintain this level of housekeeping, even though a depth of only one sixty-fourth of an inch can support a secondary explosion. It is the secondary explosions that usually result in the loss of life and extensive property damage. A properly engineered water system can maintain less than the maximum one-eighth inch depth, with minimal manual housekeeping.

Oil additives, while basically an acceptable alternative to water, cause more operational problems and the cost can be prohibitive to small country elevators.

Operational costs for each of the three alternative systems for a 1,000,000 bushel-per-month elevator are approximately: pneumatic—$20.20 per 1,000 bu; oil—$3.58 per 1,000 bu; and water—$.04 per 1,000 bu.

Installation costs are in the range of $30,000 for either an oil or water system (1,000,000 bu elevator); $44,000 for a combination oil/water system; and $300,000 or more for an aspiration system.

In addition to the fire and explosion considerations, a legislative ban on water addition will subject employees of hundreds (possibly thousands) of elevators to both pulmonary and nonpulmonary disorders as has been documented by National Institute for Occupational Safety and Health (NIOSH). Such will occur at country elevators that cannot afford the initial expense of an aspiration system, and neither the operational costs of an aspiration or oil additive system. We believe that many will be forced to close elevators.

FGIS seems to be ignoring the support from researchers, scientists, insurance companies, grain facility owners, consultants, FDA, OSHA, and others that resulted in the approval of water as a dust suppressant in March 1987.

We believe the current favorable loss experience has caused many to lose focus on the tremendous explosions that occurred in the 1970's and 1980's. We contribute the recent favorable experience to OSHA's housekeeping requirements to a large degree, a requirement to limit dust accumulations which has been met in many elevators through the use of water dust suppression systems.

The National Fire Protection Association Committee on Agricultural Dusts has just updated the standards that regulate agricultural and starch dusts to permit the use of water dust control systems.

We respectfully encourage you and your subcommittee to study this technical subject before you as carefully as any you have ever deliberated, and support the continued use of water dust suppression systems for safe grain handling workplaces.

Respectfully submitted,

(Signed) B.J. WALKER,
President.

LETTER OF SOUTH DAKOTA WHEAT COMMISSION

SOUTH DAKOTA WHEAT COMMISSION,
PIERRE, SOUTH DAKOTA, *August 24, 1993.*

Hon. TOM DASCHLE,
U.S. Senate, 317 Hart Senate Building, Washington, DC 20510.

DEAR SENATOR DASCHLE: It has been brought to our attention that your subcommittee of the Senate Agriculture Committee is planning to hold a hearing on the use of water for dust suppression on wheat shipments.

While the use of water for this purpose does have its drawbacks, the alternative use of oil suppression can present problems. Oils may fit well into dust suppression for feed crops; however, it presents quality concerns for the milling industry when applied to wheat.

We need more time to review and exchange information in order to develop alternative approaches. We feel the USDA regulatory process would be the proper way to handle the concerns rather than legislative mandates. Proposed rules have been published in the Federal Register and allow commentary until December 2, 1993.

There are numerous quality concerns as a result of the adverse weather this crop year. We are concerned that further implications resulting from grain quality legislation may further hinder movement of grain trade to the export market. Further review is necessary to evaluate the impact on prices received by producers.

Senator, wheat producers of South Dakota appreciate your concerns regarding wheat quality. We hope that you will continue to work with us on this issue.

Sincerely,

(Signed) RANDY L. ENGLUND,
Executive Director.

LETTER OF NATIONAL OILSEED PROCESSORS ASSOCIATION

NATIONAL OILSEED PROCESSORS ASSOCIATION,
WASHINGTON, DC, *August 26, 1993.*

Hon. TOM DASCHLE,
U.S. Senate, 317 Hart Senate Building, Washington, DC 20510.

DEAR SENATOR DASCHLE: On behalf of the members of the National Oilseed Processors Association (NOPA) I offer comment on the proposal of the Federal Grain Inspection Service (FGIS) to ban the addition of water to grain. NOPA represents U.S. processors of soyeans, sunflowerseed, canola, and flax.

NOPA strongly supports the FGIS proposed rule (F.R. Vol. 58, No. 148, pp. 41439–41441) to prohibit the addition of water to grain (as defined in 4 CFR, Chapter VIII, of January 1, 1993). Degradation to the condition and quality of whole grains with water added as a dust suppressant far outweighs any benefit that may be derived from the addition of water. We believe other suppression methods, including the use of vegetable oil as a dust suppressant, are available and effective and there is no justification for the use of water for dust suppression.

NOPA does not support a legislated ban on the use of water as a dust suppressant. The rule proposed by FGIS is sufficient to ban the practice and we feel this issue and other similar restrictions are best handled by the regulatory process rather than by legislation.

I ask that this letter be included in the record of your subcommittee's September 9 hearing.

Sincerely,

(Signed) SHELDON J. HAUCK,
President.

LETTERS OF NEBRASKA GRAIN AND FEED ASSOCIATION

NEBRASKA GRAIN AND FEED ASSOCIATION,
LINCOLN, NEBRASKA, *August 27, 1993.*

Hon. TOM DASCHLE,
U.S. Senate, 317 Hart Senate Building, Washington, DC 20510.

DEAR SENATOR DASCHLE: I understand that you have scheduled a hearing for September 9, 1993 on the issue of water addition to grain.

The Federal Grain Inspection Service has recently issued a proposal to prohibit the addition of water to grain. The Nebraska Grain and Feed Association supports this proposal by FGIS. I have enclosed a copy of our letter to FGIS expressing this position.

I would be pleased to respond to any questions you might have of us concerning this issue. Our organization would like to hear about the results of your hearing.

Sincerely,

(Signed) RICHARD D. SANNE,
Executive Vice President.

NEBRASKA GRAIN AND FEED ASSOCIATION,
LINCOLN, NEBRASKA, *August 27, 1993.*

GEORGE WOLLAM,
FGIS, USDA, Room 0619 South Building, P.O. Box 96454, Washington, DC 20090-6454.

DEAR MR. WOLLAM: We are submitting this letter in response to your proposal in the August 4, 1993 Federal Register to prohibit the addition of water to grain. The Nebraska Grain and Feed Association is a nonprofit organization that represents more than 500 grain elevators and retailers of grain and feed products in Nebraska.

The Nebraska Grain and Feed Association is supportive of your proposal. Although we believe that water has been, and can be properly used to control dust during the handling of grain, the opportunity for misuse is too readily available. Intentional or inadvertent overapplication of water would seriously degrade the quality of the grain.

There are other means of dust control available to the industry. Although water may be an economical dust control measure, the damage that this issue could cause to the reputation of the industry is not worth the cost savings over other dust control methods.

The Nebraska Grain and Feed Association supports your proposal to prohibit the addition of water to grain, including for dust control purposes. We will continue to encourage the grain industry in the United States to promote the use of only those procedures and practices that will enhance the quality of the product we handle.

Sincerely,

(Signed) RICHARD D. SANNE,
Executive Vice President.

LETTER OF PANHANDLE GRAIN & FEED ASSOCIATION

PANHANDLE GRAIN & FEED ASSOCIATION,
AMARILLO, TEXAS, *September 3, 1993.*

MR. JOHN FOLTZ,
USDA/FGIS, Office of the Administrator, Washington, DC 20070-6454.

DEAR MR. FOLTZ: In response to the issue of water being added to grain for the purpose of "grain dust control," the Panhandle Grain & Feed Association and its members strongly oppose this practice. Today's technology provides other alternatives that do not alter the storageability and weight of grain. We, the Panhandle Grain & Feed Association on the other hand, do not oppose using water as a carrier for a pesticide. Our Association and its members remain committed to ensuring that U.S. grain continues to provide, in reality and perception, the high quality grain the market demands.

Sincerely,

(Signed) FARIN WATT,
Vice President.

LETTER OF AMERICAN SOYBEAN ASSOCIATION

AMERICAN SOYBEAN ASSOCIATION,
WASHINGTON, DC, *September 7, 1993.*

Hon. TOM DASCHLE,
U.S. Senate, 317 Hart Senate Building, Washington, DC 20510.

DEAR SENATOR DASCHLE: On behalf of the American Soybean Association (ASA), I appreciate the opportunity to comment on proposed legislation to prohibit the addition of water to grains and oilseeds except for processing purposes. The quality reputation of U.S. soybeans is of vital importance in maintaining our foreign and domestic markets, and a top priority for American soybean producers.

The only legitimate reason for adding water to grain and oilseeds offered by commodity merchandisers and elevator operators who approve of this practice is to suppress dust. Unfortunately, instances in which excessive amounts of water are added to increase the weight and price of soybeans have been frequently documented. This practice undercuts the quality reputation of U.S. soybeans in foreign markets and encourages others in the domestic marketing system to do the same. Excessive watering can also cause major problems in processing soybeans.

Those who would continue the practice of adding water for dust suppression favor restricting the quantity which can be applied for this purpose. However, it is practically impossible to monitor soybean handling and storage conditions, and the temptation to exceed the maximum allowable application would be too great for some to resist.

The argument has also been made that alternative dust suppressants, including mineral oil and vegetable oil, can have negative effects on quality. In the case of soybeans, we know of no drawbacks that can compare with the damage that can be done to the quality reputation of our product if excessive watering continues. ASA Board resolutions encourage grain and feed handlers and other industries to use soybean oil to control dust. We also urge the insurance industry to consider rate reductions for those using soybean oil dust control systems.

We appreciate the Department of Agriculture's decision in August to propose changes in regulations that would prohibit adding water to grain and oilseeds except for processing purposes. If we had not just read widespread reports on abuses by U.S. companies in July, we would be prepared to support this regulatory approach as an alternative to legislation. Unfortunately, these reports have damaged the quality reputation of U.S. soybeans. Restoring this reputation requires an equally public effort.

U.S. soybean producers wholeheartedly support your proposal to prohibit adding water to grains and oilseeds, and to increase the penalties paid by violators. We appreciate your initiative, and look forward to working with you on this important issue.

Sincerely,

(Signed) DENNIS SHARPE,
Chief Executive Officer.

LETTER OF AMERICAN BAKERS ASSOCIATION

AMERICAN BAKERS ASSOCIATION,
WASHINGTON, DC, *September 8, 1993.*

Hon. TOM DASCHLE,
U.S. Senate, 317 Hart Senate Building, Washington, DC 20510.

DEAR SENATOR DASCHLE: The American Bakers Association, whose members represent 80 percent of the wholesale baking companies in the United States, appreciates the opportunity to respond to your concerns over the usage of water to control grain dust. We understand your concerns and sensitivities on this issue. However, we feel that you should have the benefit of knowing that other consequences may result in using the other alternatives, such as oil. The American Bakers Association feels that the alternative use of oil will be more of a negative factor on the bakability of flour that originated from oil-treated grain.

Industry studies performed in 1987 and 1988 drew concern that there would be a microbiological problem when biological particles would be trapped in the creases of the wheatberry that would result in potential health concerns. Additionally, there would be a dulling of the crumb color in white bread caused by the oil in the dust control process.

It is also our concern that even though the current proposed bill is intended to exempt milling processing, it would nonetheless be our contention that there would be a considerable amount of oil added in the grain handling system prior to the milling operation, over which the miller would have little or no control.

Senator, we would ask that you take our concerns into your decisionmaking process and be aware of the other adverse ramifications of oil usage. Representatives of our Association would be glad to meet with you at any time to discuss our concerns.

Sincerely,

(Signed) PAUL C. ABENANTE,
President and CEO.

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